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Report Highlights:

Ethiopian farmers and researchers have tried to address food security shortfalls and plant health issues through conventional breeding without success. At this time they are turning to modern biotechnological tools to meet the country's food security and nutrition needs. For example in 2019, Ethiopia commercially cultivated genetically Engineered (GE) Bt-cotton and going on the second year of confined field trails for Water Efficient Maize for Africa (WEMA).

Section 1. Executive Summary:

Ethiopia is becoming one of the top investment destinations in Africa due to its strategic location, development of industrial parks, large and growing population and relative secure situation in the region. The country has initiated policies to grow Ethiopia's agricultural sector for the last 25 years, but the country remains a net importer of food and agricultural products. Lack of infrastructure, shortage of inputs, absence of effective land policy as well as negative impacts of climate change continues to impede Ethiopia's agricultural growth.

The Ethiopian government, from the Prime Minister's office on down, has publicly showed their interests in commercializing agricultural biotechnology as a tool to achieve food security in the country. In 2018, the country officially approved its first biotechnology crop (Bacillus thuringiensis) Bt-cotton for commercialization and Confined Field Trail (CFT) on drought tolerant and pest resistant WEMA -TELA Maize. Other crops such as enset (False Banana) which is also at the CFT level where

Ethiopian researchers collaborate with the International Institute of Tropical Agriculture (IITA). This project uses genetic engineering to develop varieties of enset that are resistant to the devastating bacterial wilt disease.

Ethiopia's animal biotechnology research is at early stages of development. However, ongoing conventional animal activities for enhancing livestock productivity continue among scientists at the Ethiopian Institute Agricultural Research and at National Veterinary Institute (NVI).

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CHAPTER 1: PLANT BIOTECHNIOLOGY

PART A: Production and Trade

a) Product development
The Government of Ethiopia (GOE) approval of commercial cultivation of genetically engineered cotton and confined field trail on GE maize can be taken as an effort of the GOE to improve agricultural productivity using modern agricultural tools. Ethiopia's adoption of Bt-cotton not only has important economic importance but also expected to have positive influence on the acceptance of this technology in the region. Especially considering that a decade ago the country was at the forefront of the anti-GMO movement in Africa.

Progress on Bt-Maize

In 2018, the Environment Forest and climate Change Commission and biosafety technical working team issued a five year permit to conduct confined field trails on drought tolerant and pest resistant WEMA-TELA Maize, developed under the philanthropic Water Efficient Maize for Africa (WEMA) project in partnership with the African Agricultural Technology

Foundation. The WEMA-TELA Maize trails have been successfully conducted in 2019 by the Ethiopian Institute for Agricultural Research. The second trail will start up in November during the dry season using controlled drip irrigation system.

Progress on Bt-Cotton

Bollworms are the major constraints for cotton production and can cause 30-50 percent of yield loss in in the cotton growing area of Ethiopia especially the rift valley zone. Ethiopia started Bt-cotton confined field trail in 2017 and received official approval for commercial release in 2018. The varieties and respective performance of the two varieties are presented below.

Table: Bt- cotton varieties and their performance at the EIAR/WARC site.

Bt-cotton variety	Released year	Seed cotton yield (kg/ha)	Ginning Percent GOT %	Micronaire	Fiber length(mm)	Fiber Strength g/tex
JKCH-1947	2018	3056.2	39.4	4.06	27.78	27.75
JKCH- 1050	2018	3049.6	39.2	3.95	28.44	28.59

Source: WARC/EIAR Progress report 2018

Progress on Enset (False banana)

Enset is an indigenous non-tree crop which supports the livelihoods of about 20 million people, mainly in the South and Southwestern parts of the country where the population density is more than 700 people per sq.km. Ethiopian researchers collaborate with the International Institute of Tropical Agriculture (IITA) using genetic engineering to develop varieties of enset that are resistant to the devastating bacterial wilt disease. If successful, this research could have a real impact on food security in the region. Researches have turned to genetic engineering to solve this problem as conventional breeding options have been ineffective for the last three decades.

1) COMMERCIAL PRODUCTION

In Ethiopia, the expansion of the textile manufacturing sector has shown an increasing demand for cotton.

The first commercialized GE cotton is planted on 130 ha in the 2019 production year. The selling price and availability of the Bt-cotton seed is an issue for cotton farmers due to high

price and limited supply of FOREX to import the seed. JK Agri. Genetics is Indian company which received approval from the Ethiopian government to supply the seeds in the country.

2) EXPORTS

Ethiopia does not have any GE crops to be exported.

3) IMPORTS

There are currently no imports of GE grains or oilseeds. However, Ethiopia does import processed agricultural products such as soybean and corn oils, as well as breakfast cereals made from GE ingredients. With respect to non-food products, Ethiopia imports GE-cotton from India and the United States.

4) FOOD AID

Ethiopia is one of the largest food aid recipient countries in Africa. Some food aid commodities, like corn-soy blend (CSB) which are GE products for school feeding and humanitarian program allowed to come to the country under a special waiver.

PART B: Policy

a) REGULATORY FRAMEWORK:

The Environment Forest and Climate Change Commission, which is under the Prime Minister's office, is the competent authority within the Government of Ethiopia (GOE) that is responsible for the Biosafety Proclamation, which is the overarching legislation governing the use of GE technology. The Ethiopian Institute for Agricultural Research (EIAR), which is housed under the Ministry of Agriculture, provides technical expertise to support the research and development, safety assessments and field trials, as well as enforcing the provisions within the proclamation and its subordinate implementing regulations. The Ethiopian Biotechnology Institute (EBTi), which is housed under the Ministry of Information, the Ministry of Agriculture, and the Ministry of Industry (MOI) also plays 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 five implementing directives to spell out specific requirements regarding the research and application of the technology. These legal changes were due to stronger political push from the top officials based on the expectation that biotech cotton, particularly Bt cotton, would boost local production to satisfy the expected demands from the growing textile and apparel industry. The Ethiopian Biotechnology Council, EIAR and EBTi are responsible for coordinating biotechnology policy and research in different sectors.

b) APPROVALS:
In 2018, The Environment Forest and Climate Change Commission has approved the commercial cultivation of genetically engineered cotton after two years of confined field trail research by EIAR. The two Bt-cotton hybrids seed (JKCH 1947, JKCH 1050) which obtained official approval were sourced from JK Agri Genetics limited from India.

A five years approval from 2018 up to 2023 for confined field trail of insect resistant and drought tolerant maize (WEMA/TELA) was obtained and planted early September 2018 for the first time. The second trail will be started the coming November 2019 in the same location of EIAR sites under controlled drip irrigation system.

c) STACKED or PYRAMIDED EVENT APPROVALS:
The approval for WEMA-TELA stacked maize involve more than one trait for both insect resistance and drought tolerance. At this time is it a bit unclear which are the directives containing special provisions for stacked event approvals.

d) FIELD TESTING

The first round of confined field trail of WEMA-TELA maize has shown promising results. The second round of trail will start in November.

e) INNOVATIVE BIOTECHNOLOGIES

At this time no Ethiopian research body is working with new innovative technologies such as genome editing. Tissue culture and molecular characterization are the most common activities that many institution and companies are using. Recently the Ethiopian Biotechnology Institute (EBTi), Ethiopian Academy of Sciences (EAS) and Beijing Genomics Institute Group (BGI) a genome sequencing or DNA sequence company signed a tripartite agreement focuses on BGI-Africa (African genomic institute as a branch of BGI) in Addis Ababa. EBTi will facilitate 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 -- animal, human, plant or bacteria which are sequenced in the country.

f) COEXISTANCE:
Not applicable.

g) LABELING:
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 on products to be purchased. The biosafety law requires mandatory labeling of all products of agricultural biotechnology in order to protect “consumers’ right to

know. The GOE does not have enough capacity to enforce this labeling requirement. For more details on labeling, please refer to GAIN ET1707.

h) MONITORING AND TESTING:
While the capacity exists, Ethiopia does not have uniform monitoring and testing mechanisms to detect GE products.

i) Low Level Presence 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 extant laws related to the seed system in Ethiopia. The seed variety registration and release are one of regulatory requirement to be done by National Variety Release Committee (NVRC) before officially release the seed to the farmers. The Committee is composed of breeders (4), agronomists (1), crop protection specialists (2), research/extension (1) and socio-economists (1) representing different research institution 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 regime for the protection of intellectual property rights in Ethiopia. The country is also a member of the World Intellectual Property Organization. However, the country has yet to sign several major international intellectual property rights (IPR) treaties. Therefore, IPR protection of commercially planted GE crops is uncertain.

l) CARTAGENA PROTOCOLRATIFICATION:
Ethiopia ratified the Cartagena Protocol on Biosafety (CPB) in May 24, 2000. The international regulatory agreement requires countries to address environmental safety and human health by ensuring safe handling, transport, and use of GE products. The Environment Forest and Climate change commission is the Competent National Authority (CNA) and contact point for the Cartagena Protocol, and oversee the national biosafety regulation. According to their most recent submission (2016) to the CPB secretariat, the country has a regulatory framework, which is underpinned by the newly revised Biosafety Proclamation and implementing directives in place to implement the protocol.

m) INTERNATIONAL TREATIES/FORUMS
Ethiopia was known for the vanguard of the anti-GMO movement in Africa and, to a certain extent, set the tone for the rest of the continent. In fact, while working with the African Union Commission, Ethiopia helped to pen the restrictive Africa Model Law which has contributed to the delayed adoption of the technology on the continent. However, Ethiopia now appears to have broken from its past position and approved the environmental release of

Bt cotton and research trials on biotech maize. This paradigm shift, however, has not resulted in changes to the Africa Model Law, nor does the GOE appear to be actively promoting the technology in international fora, such as Codex.

n) RELATED ISSUES: N/A

PART C: MARKETING

a) PUBLIC/PRIVATE OPINIONS

The Ethiopian government has permitted commercial cultivation of Genetically Engineered (GE) cotton and field research on GE maize. These two projects are expected to fulfill the high demand of cotton lint for emerging textiles industries and to support the food security programs in the country. The GOE sees biotechnology as an option to grow the rural economy. There are no officially known active campaigns to discourage or scare consumers from eating food products containing GE ingredients. This is in part because there is little consumer awareness of this technology combined with the fact that there are so few foods in the marketplace that are made from GE crops. That said, leading up to parliament's ratification of the newly revised Biosafety Proclamation in August of 2015, there were efforts within the ant-GMO activist and environmental and consumers rights groups to discourage the GOE from moving ahead with the new legislation. These groups cited concerns that the introduction of the technology, even GE cotton, would cause Ethiopia to sacrifice its rich biodiversity and cause irreparable damage to the environment. These claims opinions and views receive periodic coverage by the local press. At the same time, the GOE and other proponents of the technology have also raised their voices to dispel these rumors and promote the introduction of the technology.

b) MARKET ACCEPTANCE/STUDIES

Ethiopian cotton farmers showed willingness and acceptance through planting 130 ha of cotton using Bt-cotton seed. They are expecting positive financial benefits from the newly introduced seed. The performance of the crop which is on the field in 2019 will help to move ahead with the introduction of other GE crops in the country. Ethiopia's historic counter-stance against the technology pressures from the anti-GE community, and perceived consumer concern will be tackled depending on the success of Bt- cotton and WEMA-maize CFTs.

CHAPTER 2: ANIMAL BIOTECHNOLOGY

PART D: PRODUCTION AND TRADE

a) PRODUCT DEVELOPMENT:
No genetically engineered or coined animals are under development in Ethiopia.
Ethiopia's animal biotechnology research is at early stages of development. However, ongoing biotechnology activities for enhancing livestock productivity continue among scientists at the Ethiopian Institute Agricultural Research and at National Veterinary Institute (NVI) on the following areas.
   - Detection of selected signatures for trypano tolerance traits/genes in Ethiopia cattle.
   - Genome wide association studies for egg production, egg quality and natural antibody (NAB) traits in indigenous chicken in Ethiopia.
   - Harnessing fecundity and muscle growth gene to improve the productivity of indigenous sheep in Ethiopia using genomic approach.
   - Other related animal biotechnology research includes development of vaccines and diagnostic kits.

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) INNOVATIVE BIOTECHNOLOGIES:
Under Ethiopia's definition of biotechnology, there is research and work being done in the areas of embryo transfer, reproductive synchronization, on quality of semen and sexed cattle semen. For more information, please refer to the Ethiopian Institute of Ag Research list of biotech-related research activities.

c) LABELING AND TRACEABILITY: N/A
d) INTELLECTUAL PROPERTY RIGHTS (IPR):
Refer to corresponding section in plant biotechnology section.
e) INTERNATIONAL TREATIES and FORUMS:
Refer to corresponding section in plant biotechnology section.
f) RELATED ISSUES: N/A

PART F: MARKETING

a) PUBLIC/PRIVATE OPINIONS:

Public awareness of biotechnology is limited. Nonetheless, the public is thought to be generally less supportive of animal biotechnology applications compared to those of plant biotechnology this may be due to spiritual sentiment.

b) MARKET ACCEPTANCE/STUDIES: N/A

Attachments:

No Attachments