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Prepared By: Khaled Elzoughbi

Approved By: Harrison Grafos

Report Highlights:

The UAE promotes biotechnology through a research ecosystem focused on innovation. Notable advances center on plant biotechnology such as quinoa and salicornia, in addition to the date palm. Animal biotechnology highlights include the world's first cloned camel and plant-based meat initiatives. Federal Law No. 9 of 2020 mandates labeling, and generally circumscribes, the import of genetically engineered product with 0.9 percent or more content.

AGRICULTURAL BIOTECHNOLOGY ANNUAL 2024

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EXECUTIVE SUMMARY

The United Arab Emirates enjoys a panoply of institutes and research centers that support research and development of biotechnology and produced the world's first cloned camel in 2009. Genetically engineered food with less than 0.9 percent of components derived from bioengineering may be imported, generally with circumscription for higher content. See GAIN Report TC2020-0024, "UAE Passes New Mandatory Biotech Labeling Law," for additional information.

CHAPTER 1: PLANT BIOTECHNOLOGY

PART A: PRODUCTION AND TRADE

a) RESEARCH AND PRODUCT DEVELOPMENT

Research has shown that the genes of the United Arab Emirates' (UAE) indigenous plants (halophytes and non-halophytes) living in harsh environments are tolerant and resistant to high temperature, drought, and salinity despite the harsh environment.[1] These unique genes could be used to green the deserts and improve crops. As a result, UAE universities and research institutes in the last 10 years have more closely examined the value of the UAE's flora.

The International Center for Biosaline Agriculture has, for instance, undertaken work on quinoa.[2] Quinoa is already a hardy crop, and it can adapt to harsh climates like the UAE's, including its high salinity. ICBA researchers looked at seed size, flowering timing, and bitterness to develop an even higher-performing crop (Figure 1).

Figure 1: Quinoa Breeding

Source: ICBA

These efforts resulted in a variety that matures earlier, is less bitter, and yields more. It is hoped that these innovations will result in greater farmer productivity and incomes—in addition to supporting nutritional needs. Salicornia is another hardly plant showing promise in saline

[1] Gairola, Sanjay et al. "Strengthening desert plant biotechnology research in the United Arab Emirates: a viewpoint." *Physiology and molecular biology of plants: an international journal of functional plant biology* vol. 24,4 (2018): 521-533.

[2] https://www.biosaline.org/sites/default/files/publicationsfile/quinoa-gwas-study.pdf

environments.[3] ICBA envisions the plant serving as a food source, in addition to supplying fodder for animal feed and biofuel, thus potentially enhancing food security and sustainability.

Other key developments in the country include:

- The University of Sharjah began offering a Bachelor of Science in Biotechnology in 2008.[4]

- The United Arab Emirates University inaugurated the Khalifa Center for Genetic Engineering and Biotechnology in 2014. It focuses on exploring flora of the arid region to generate scientific knowledge and address the global challenges in food security and sustainable agricultural practices through genomics, genetic engineering, and biotechnological innovation. A goal is increasing the ability of plants to tolerate drought, heat, and salt.

- Khalifa University established the Khalifa University Center for Biotechnology in 2015 to develop the university's capabilities in training and research to respond to the country's priority areas.

- ICBA is an international, not-for-profit applied agricultural research center established to identify, test, and introduce smart crops and technologies that are best suited to different regions. These crops may be affected by salinity, water scarcity, and drought by developing new resilient and nutritious varieties of them by combining genetic and genomic approaches.

- The Masdar Institute of Science and Technology is a graduate-level university with a focus on alternative energy and sustainable technologies including biofuels from halophytes. Masdar Institute was established with the cooperation of the Massachusetts Institute of Technology to support building a knowledge-based and technology-exporting economy in Abu Dhabi.

- The Biotechnology Research Center (BRC) is part of the Technology Innovation Institute (TII). TII belongs to Abu Dhabi Government's Advanced Technology Research Council. BRC uses recent advances in molecular, cellular, and digital technologies to develop human expertise for better healthcare outcomes through molecular and genomics strategies to enhance bioinformatics and biomedicine.

- The Advanced Technology Research Council is the overarching technology research body in Abu Dhabi and more broadly, in the UAE. ATRC is responsible for defining Abu Dhabi's research strategy across academia and industry, consolidating and facilitating efficient investment funding, and driving policy and regulation for decision-making. It also commercializes research and development; priority sectors include healthcare, food and agriculture, sustainability, energy and environment, aerospace, safety and security, and transport.

[3] https://www.biosaline.org/projects/salicornia-biosaline-agriculture
[4] https://www.sharjah.ac.ae/academics/degree/undergraduate/biotechnology

- ICBA's genebank is another key plant species resource in the UAE. Developed to collect and preserve germplasm for plants that is more resilient to harsh climates like the UAE's (drought, heat, and saline), the bank is designed as a resource for researchers, farmers, and others across more than five dozen countries. According to ICBA, the bank houses 17,000 accessions derived from 325 plant species, including 5,000 barley and 1,200 quinoa accessions. It also includes seed samples from plants, housing 310 from across the country.[5]

- Abu Dhabi's Environment Agency opened the Plant Genetic Resources Centre in Al Ain in March of this year. With a focus on seeds and tissue conservation, the center aims to safeguard wild plant and other agricultural varieties in the country. The center's state-of-the-art facility can ultimately store 20,000 specimens and employs tissue culture, cryopreservation, and genetic testing, along with traditional methods such as seed storage in cold rooms.[6]

b) COMMERCIAL PRODUCTION

The date palm (*phoenix dactylifera*) is one of the most important crops in the UAE and Arabian Gulf. Micropropagation regeneration of date palm through tissue culture (*vitro* propagation) techniques is sometimes used to induce mutations to improve fruit yield and increase tolerance to salinity and drought stress. Emirates University's Date Palm Tissue Culture Laboratory is a leader in supporting date palm propagation. It is estimated that the laboratory produces more than 40,000 seedlines per year and supports the 40 million date palms and 120 varieties of date palms in the UAE. Countries as diverse as Egypt, India, Iraq, Jordan, Oman, Saudi Arabia, and Thailand benefit from high-quality seedling exports from the laboratory.[7]

c) EXPORTS

Information unavailable.

d) IMPORTS

The UAE allows import of agricultural products containing a maximum of 0.9 percent in components derived from bioengineered sources per Federal Law No. 9 of 2020 (see also GAIN Report TC2020-0024).

e) FOOD AID

Through humanitarian organizations such as the Emirates Red Crescent, the Zayed bin Sultan Al Nahyan Charitable and Humanitarian Foundation, and the Khalifa bin Zayed Al Nahyan Foundation, the UAE supplies food aid to Afghanistan, Chad, Ethiopia, and Sudan. The UAE Food Bank also provides support domestically and internationally while the Chivalrous Knight 3 initiative currently focuses on aid to Gaza.[8]

f) TRADE BARRIERS

None.

[5] https://www.biosaline.org/about-icba/facilities/genebank
[6] https://www.mediaoffice.abudhabi/en/environment/hamdan-bin-zayed-inaugurates-plant-genetic-resources-centre-in-al-ain/
[7] https://www.wam.ae/en/details/1395302761158
[8] https://www.wam.ae/en/article/b4l5zf9-operation-chivalrous-knight-implements

PART B: POLICY

a) REGULATORY FRAMEWORK

Federal Law no. (9) of 2020, along with its associated implementation regulations, governs the import, export, re-export, transit, trade, development, production, and transfer of food and agricultural items containing 0.9 percent or more of components derived from genetic engineering. The biosafety law requires businesses secure a license to import genetically engineered (GE) products into the UAE and established the creation of an application registry. It also specifies labeling requirements for GE food products and outlines penalties for non-compliance.

The following are exempt from these provisions:

- Products with GE components comprising less than 0.9 percent.
- "GMOs" or their derivatives that are pharmaceutical substances for humans and the genetic modification of human cells.

Legal term (in Arabic)	Legal Term (in English)	Laws and Regulations where term is used	Legal Definition (in English)
التحوير الوراثى	genetic modification	Federal Law No. (9) of 2020	modification of genetic material using modern biotechnology
الكائن المحور وراثيا	genetically modified organism	Federal Law No. (9) of 2020	organism having a new combination that is different of its original combination of genetic materials obtained using modern biotechnology
التكنولوجيا الاحيائية الحديثة	modern biotechnology	Federal Law No. (9) of 2020	application of *invitro* techniques for deoxyribonucleic acid (DNA) and direct injection of DNA into cells or organelles, or integrating cells until they fall outside their taxonomic rank and overcome the natural physiological barriers of reproduction or recombination, and they are not considered techniques used in natural breeding and selection

b) APPROVALS/AUTHORIZATIONS

Information unavailable.

c) STACKED OR PYRAMIDED EVENT APPROVALS/AUTHORIZATIONS
Not applicable.

d) FIELD TESTING
Not applicable.

e) INNOVATIVE BIOTECHNOLOGIES
Not applicable.

f) COEXISTENCE
Not applicable.

g) LABELING AND TRACEABILITY
The importer, exporter, trader, developer, manufacturer, and producer of GE commodities or their products shall place an information label on each package. The label must state that the product contains "Genetically Modified Organisms or their products" and any other information as determined by the law's implementing regulation (Ministerial Decree 84 of 2020).

h) MONITORING AND TESTING
Dubai Municipality's Dubai Central Laboratory uses the real-time polymerase chain reaction method to examine food samples, verifying the alignment of GE foods with their labels and local regulations. The UAE is home to several other accredited laboratories equipped to detect and analyze GE products:

- Al Hoty Stanger Laboratories ICAD, Abu Dhabi
- SGS Gulf Food and Chemical Testing Laboratory, Dubai
- Inspectorates International Limited, Dubai
- Holistic International Testing Services, Dubai
- Advance Biotechnology Center, Dubai

i) LOW LEVEL PRESENCE POLICY
Not applicable.

j) ADDITIONAL REGULATORY REQUIREMENTS
Ministerial Decree No. 239 of 2018 on National Food Accreditation and Registration System mandates that imported, locally produced, or modified food, ingredients, or composition be registered in ZAD prior to reaching the market. ZAD is an integrated smart platform for food product data.

k) INTELLECTUAL PROPERTY RIGHTS

a. Federal Law No. (9) of 2013 Concerning Plant Genetic Resources for Food and Agriculture.
b. Federal Law No. (8) of 2021 on Access to Genetic Resources and their Derivatives and Fair and Equitable Sharing of Benefits Originating from their Utilization.

l) CARTAGENA PROTOCOL RATIFICATION

The UAE ratified the Cartagena Protocol on Biosafety to the Convention on Biological Diversity in July 2014 through Federal Decree No. (77) of 2014.

m) INTERNATIONAL TREATIES AND FORUMS

Convention Name	**Status**	**Date of Approval, Acceptance, Accession, or Ratification**
Regional Organization for the Protection of the Marine Environment	Ratified	April 1, 1979
Protocol Concerning Regional Cooperation in Combating Pollution by Oil And Other Harmful Substances In Cases Of Emergency to the Kuwait	Ratified	April 1, 1979
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Ratified	March 3, 1990
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Ratified	May 9, 1990
Protocol Concerning Marine Pollution resulting from Exploration of the Continental Shelf	Ratified	July 16, 1990
United Nations Framework Convention on Climate Change	Ratified	November 20, 1995
Agreement on the Application of Sanitary and Phytosanitary Measures	Accession	April 10, 1996
United Nations Convention to Combat Desertification	Ratified	October 21, 1998
Convention on Biological Diversity	Ratified	November 24, 1999
Stockholm Convention on Persistent Organic Pollutants	Ratified	July 11, 2002

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Ratified	August 11, 2002
International Treaty on Plant Genetic Resources for Food and Agriculture	Ratified	January 24, 2004
Kyoto Protocol to the United Nations Framework Convention on Climate Change	Ratified	December 29, 2004
Vienna Convention for the Protection of the Ozone Layer	Ratified	December 29, 2004
Montreal Protocol on Substances that Deplete the Ozone Layer	Ratified	December 29, 2004
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer	Ratified	February 16, 2005
International Plant Protection Convention	Accession	October 2, 2005
Convention on Wetlands of International Importance - Ramsar	Ratified	February 6, 2007
Protocol Nagoya - Kuala Lumpur Supplementary to the Cartagena Protocol on Biosafety on liability and redress	Ratified	July 23, 2014
Cartagena Protocol on Biosafety	Ratified	July 23, 2014
Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their use	Ratified	July 23, 2014
Intergovernmental Platform on Biodiversity and Ecosystem Services	Ratified	January 11, 2015
Minamata Convention on Mercury	Ratified	March 25, 2015

Convention on the Conservation of Migratory Species of Wild Animals	Ratified	May 24, 2015

Source: Ministry of Climate Change and Environment

n) RELATED ISSUES
Not applicable.

PART C: MARKETING

a) PUBLIC/PRIVATE OPINION
A lack of awareness pervades the discourse around GE food. Most consumers are skeptical of biotechnology without basing their opinions on science. Media reports generally express concern on potential negative environmental and biodiversity effects, rather than on potential positive benefits to society.

b) MARKET ACCEPTANCE/STUDIES
Information unavailable.

CHAPTER 2: ANIMAL BIOTECHNOLOGY

PART D: PRODUCTION AND TRADE

a) RESEARCH AND PRODUCT DEVELOPMENT

- The Reproductive Biotechnology Center (RBC) focuses its research on the development and application of the latest biotechnology techniques for the production and growth of elite animals and preservation of endangered species of the region. RBC successfully produced the world's first calf from a cloned camel in 2009 named "Injaz." The camel was cloned using ovarian cells of a camel; it was then conceived and delivered naturally.

- In 2022, the UAE-based International Foodstuffs Company (IFFCO) announced the launch of its "Thryve" brand as the first plant-based meat factory in the Gulf Cooperation Council region. IFFCO has been reported to be working with the UAE government to set regulatory standards for plant-based meat.

- The World Organization for Animal Health identifies the Abu Dhabi Agriculture and Food Safety Authority's Collaborating Centre for Camel Diseases as a key partner to address camel ailments in the Middle East.[9] The center made progress in disease management, antibiotic use, pathogen detection, and more.

- AgriFood Growth and Water Abundance (AGWA) and Believer Meats are collaborating in

[9] https://rr-middleeast.woah.org/en/news/adafsa-collaborating-centre/

cultivated meat. Believer Meats, for its part, aims to set up a regional headquarters, production, and research and development in Abu Dhabi, including in creating a "Meats Innovation Academy" for sustainable food technology. AGWA seeks to advance the regulatory framework for halal certification, among other aspects.

b) COMMERCIAL PRODUCTION
Not applicable.

c) EXPORTS
Not applicable.

d) IMPORTS
See Chapter 1, part A, sub-paragraph d.

e) TRADE BARRIERS:
None.

PART E: POLICY

a) REGULATORY FRAMEWORK
See Chapter 1, paragraph B, sub-paragraph a.

b) **APPROVALS/AUTHORIZATIONS**
See Chapter 1, paragraph B, sub-paragraph b.

c) INNOVATIVE BIOTECHNOLOGIES
Not applicable.

d) LABELING AND TRACEABILITY
See Chapter 1, paragraph B, sub-paragraph g.

e) ADDITIONAL REGULATORY REQUIREMENTS
See Chapter 1, paragraph B, sub-paragraph j.

f) INTELLECTUAL PROPERTY RIGHTS (IPR)
See Chapter 1, paragraph B, sub-paragraph k.

g) INTERNATIONAL TREATIES AND FORUMS
See Chapter 1, paragraph B, sub-paragraph m.

h) RELATED ISSUES
See Chapter 1, paragraph B, sub-paragraph n.

PART F: MARKETING

a) PUBLIC/PRIVATE OPINIONS

See Chapter 1, paragraph C, sub-paragraph a.

b) MARKET ACCEPTANCE/STUDIES
See Chapter 1, paragraph C, sub-paragraph b

CHAPTER 3: MICROBIAL BIOTECHNOLOGY

PART G: PRODUCTION AND TRADE

a) COMMERCIAL PRODUCTION
None.

b) EXPORTS
Information unavailable.

c) IMPORTS
See Chapter 1, part A, sub-paragraph d.

d) TRADE BARRIERS
None.

PART H: POLICY

a) REGULATORY FRAMEWORK
See Chapter 1, paragraph B, sub-paragraph a.

b) APPROVALS/AUTHORIZATIONS
See Chapter 1, paragraph B, sub-paragraph b.

c) LABELING AND TRACEABILITY
See Chapter 1, paragraph B, sub-paragraph g.

d) MONITORING AND TESTING
See Chapter 1, paragraph B, sub-paragraph h.

e) ADDITIONAL REGULATORY REQUIREMENTS
See Chapter 1, paragraph B, sub-paragraph j.

f) INTELLECTUAL PROPERTY RIGHTS
See Chapter 1, paragraph B, sub-paragraph k.

g) RELATED ISSUES
See Chapter 1, paragraph B, sub-paragraph n.

PART I: MARKETING

a) PUBLIC/PRIVATE OPINIONS
See Chapter 1, paragraph C, sub-paragraph a.

b) MARKET ACCEPTANCE/STUDIES
See Chapter 1, paragraph C, sub-paragraph b.

Attachments:

No Attachments