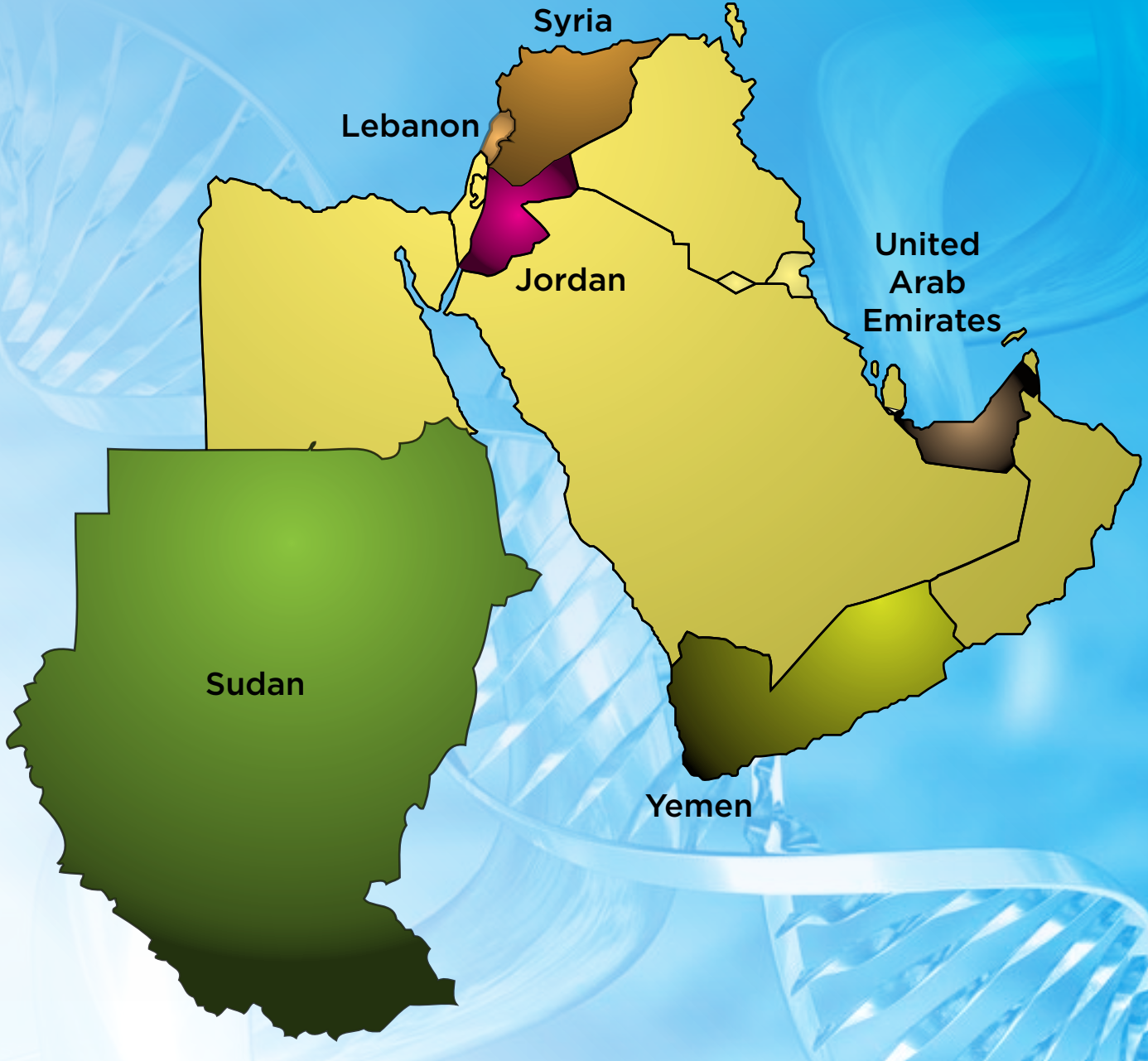
Chapter II
Country Profiles; The regional analysis



Chapter II: Country Profiles; the regional analysis

2.1. Introduction

During the last decades, scientific and technological progress in modern biotechnologies have opened new perspectives to the national/regional strategies to fight poverty by providing powerful tools to contribute to food productivity and safety and promote environmental sustainability. In agriculture, the use of modern biotechnologies has had its main expression in the development, introduction and wide dissemination of genetically modified organisms (GMOs) including genetically modified (GM) crops, and related commodity products. GM crops are increasingly part of the global food/feed market, including in the developing countries where they are contributing to higher production and economic benefits.

In the Near East and North Africa region, agriculture is a key element of the economy and an important source of employment and most of the countries are committed to implementation of the Global Plan of Action for Conservation and Sustainable use of Plant Genetic Resources for Food and Agriculture for boosting production and development. Despite the initial acceleration, the region is experiencing delays in the adoption of new biotechnologies and in the implementation of national NBFs, mainly due to lack of adequate institutional capacities in the area. Once functional, the NBFs will provide the base to create an efficient biosafety management system to merge countries needs for a smooth advancement in biotechnology applications with the necessary regulatory and technical precautions.

In this context, a consultation was organized on 'Biotechnology and Biosafety for Agriculture and Environment' in Aleppo, Syria, on 8-10 September 2007 with the national authorities in the region and in coordination established with other international organizations such as the United Nations Environment Programme (UNEP) and the International Centre for Agriculture Research for Dry Land Areas (ICARDA). The solid dialogue confirmed that foundations have been laid for future sustainable growth in biotechnology, and biosafety was a priority area of work in the region. In particular, it showed that most of the countries of the region have their primary legislation in place and are currently developing specific implementing regulations in line with the international obligations. However, human and technical capacities haven't followed these development trends and show a great variability from one country to another. These weaknesses are especially clear with respect to GMOs research, monitoring and detection activities. This was, as it was pointed out, mainly due to a general lack of coordinated investment in biosafety for biotechnology advancement in most countries of the region.

The regional workshop in Aleppo brought the countries to opt for improving their regional cooperation in GMO detection as a step towards strengthening their capacities in the area in a cost effective manner.

As a follow-up, six countries from the region, namely: Lebanon, Jordan, Sudan, Syria, united Arab Emirates and Yemen, have submitted a request for technical assistance to FAO and a proposal for a regional technical cooperation project was developed, aiming at:

- establishing a regional mechanism for sharing experiences, expertise and know-how and harmonizing laboratory procedures, standards, and techniques of GMO detection;
- training relevant officers and technicians at national level in the subject,
- developing a platform for information sharing and networking amongst technical staff in GMOs detection laboratories.

The main outcome of the project will be increased collaboration in GMOs detection and enhanced harmonization of the related laboratory procedures, standards, techniques among the participating countries as well as strengthened technical skills in GMOs detection in agriculture products. These together will foster the process for setting up a 'Regional Platform for GMO Detection' for the regular exchange of information and experience that progressively could be extended to other countries in the area.

The project has four main outputs as follows:

1. Enhancing regional collaboration in GMO detection among the participating countries, in particular among national reference GMO detection laboratories in order to harmonize their practices and certification schemes based on common standards and good practices.
2. Developing a training package in GMO detection, including an information exchange forum to be made available for the project training activities as well as for future in-house training courses.
3. Increasing the capacities of technical staff of the participating countries in GMO detection.
4. Preparing an agreement between the participating countries for the establishment of the 'regional platform for GMO detection in the region'.

2.2. Enhancing regional collaboration in GMO detection:

The project has undertaken a stock-taking exercise in the six countries through national assessments of the current biotechnology applications in these countries with special reference to GMO production, GMO detection practices, available laboratory expertise, techniques and equipment in use and possible physical, technical and regulatory gaps and/or bottlenecks.

Moreover, this process provides the benchmark for these areas and thereby, will facilitate setting up the process for establishing a regional platform. The national assessments have been carried out by national consultants. The analysis of the results of these assessments will form the basis for this benchmark document entitled: 'Status and Options for Regional GMO detection Platform'-A Benchmark for the region. This document.

The following set of tables is a synthesis and comparative analysis of the status and issues related to biotechnology research, existing infrastructure and human resources engaged in agricultural biotechnology in the six countries under study. This chapter will also focus on GMO detection in the region including:

i) A comparative analysis of the GMO detection practices in use in the six countries involved;

ii) Identification of options for the harmonization and partnerships among the coutries GMO-detection practices and standards

2.3. Table 1: Highlights of Biotechnology Applications

Country	Plant Biotech.	Animal Biotech.	Others
Jordan	• Tissue culture • Micro-propagation of different plants • Production of disease-free plants • Selection of biotic and abiotic tolerant stocks • Characterization of plant genetic resources (using molecular markers such as RAPD,AFLP,SSR and ISSR) • Virus and fungi detection and identification	• Production of immunological diagnostic kits and animal vaccines • Screening for organisms that have a potential biotechnological application • Animal and human cell culture on medical and veterinary applications	• Study conducted on the (Allele and genotype frequency for pti gene in cows at Jordan)
Lebanon	• Tissue culture • True-to-typness of plant materials • Production of virus free materials • Characterization of plant genetic resources (using molecular markers) • Virus detection and identification • Immunodiagnostic of viruses • GM tomatoes tolerant to TYLCV	• Diagnosis of animal diseases (using RT-PCR) • Identification of the ethiologic agents that are involved in economic diseases of animals (using RT-PCR)	• Detection of pathogens in food products • Detection of myco-toxins in food • Towards production of biopesticides (Bt)
Sudan	• Plant tissue culture for mass production • Development of doubled haploid wheat for heat stressed environment • Transgenic drought tolerance Maize	• Production of vaccines • Artificial insemination to improve the genetic make up and productivity of the Sudanese Nubian goats • Embryo transfer (ET) in bovine • Diagnosis of viral and parasitic diseases	• Molecular diagnostic techniques used for detection and identification of specific infectious agents
Syria	• Molecular biology techniques • Genetic transformation • Tissue cultures • Animal and human cell culture • In vitro fertilization and embryo culture	• Embryo transfer • Diagnosis of animal diseases • Production of animal vaccines • Fingerprinting of Alawasi local sheep	• Brewing industry • Beer industry • Yeast production
UAE	• Micropropagation and tissue culture of date palms • Biosaline Agriculture		
Yemen	• Several breeding programs of field crops • Tissue culture		• Fishing and Algae Biotechnology

2.4. Table 2: Institutions Involved in Biotechnology

Country	Academia		Research Institutions	
	Public	Private	National	International
Jordan	Jordan Univ. of Sci. & Tech. (JUST) Univ. of Jordan Al-Balqa Applied Univ. Hashemite University Mu'tah Univ. Yarmuk Univ. Al-Albyt Univ.	Although some of the private universities have biotechnology programs. No research activities are going on in Biotechnology. Research is very limited as they are teaching oriented.	National Center for Agriculture Research and Extension (NCARE) National Biotech. Center Jordan Institution for Standards and Metrology Ministry of Agric. (MOA)	JOVAC VAPCO Syngenta Monsanto
Lebanon	Lebanese University (Establishment of AZM Center of Biotechnology in process)	American Univ. of Beirut Saint Joseph Univ. (USJ) American Univ. for Sci. & Tech. (AUST) Univ. of Balamand (UOB) Notre Dame Univ. Lebanese American Univ. (LAU) University of Saint Esprit of Kaslik (USEK)	Lebanese Agricultural Research Institute (LARI) Industrial Research Institute (IRI) Lebanese National Council for Science Research (LCNRS)	
Sudan	University of Khartoum Gezira university University Sudan	Nilain University	Agric. Res. Corporation (ARC) Commission of Biotech & GE Lina Tissue culture Co Date Palm production Co. Kenana Sugar Co.	
Syria	Tishreen Univ. Aleppo Univ. Damascus Univ. ALU-Bath Univ.		Ministry of Agric. & Agrarian Reform (MAAR) Atomic Energy Commission of Syria (AECS) General Commission for Biotech. (GCBT) Scientific Studies and Res. Center (SSRC) Green House Co. (Latakia) Scientific Council for Pharmaceutical Industries (SCPI)	International Center for Agric. Res. in the Dry Areas (ICARDA) Arab Center for Studies of Arid and Dry Areas (ACSAD)
UAE	Date Palm Tissue Culture Lab. (DPTCL)		Al Wathba Marionnet Green coast nurseries Al Rajhi Laboratory Advanced Biotech. Center (ABC), Dubai Dubai Biotechnology and Research Park (DuBiotech)	International Center for Biosaline Agriculture (ICBA) APRP/ICARDA International Center for Agric. Res. in the Dry Areas
Yemen	Univ. of Sana'a Univ. of Aden Univ. of Taiz Univ. of Hadhramout Univ. of Hudaida Univ. of Dhamar Univ. of Ibb		Agricultural Research and Extension Authority Ministry of Agriculture & Irrigation	YASAD YAPB

2.5. Table 3: Institutions Involved in GMOs R & D

Country	Academia		Public Institutes	Private Companies
	Public	Private		
Jordan	Jordan Univ. of Sci. & Tech. (JUST) Univ. of Jordan Al-Balqa Applied University Mu'tah University Yarmuk University Al-Albyt University		National Center for Agriculture Research and Extension (NCARE) National Biotech. Center FDA Jordan Institution for Standards and Metrology Ministry of Agric.	Al-Nawa Nurseries Al-Barakah Nurseries Sukhtian Company JOVAC VAPCO Syngenta Monsanto
Lebanon	Lebanese University (Establishment of AZM Center of Biotechnology in process)	American University for Science and Technology (AUST): Reference Laboratory upon designation by the Ministry of Economy and Trade to be the accredited laboratory for GMOs detection. Univ. of Balamand (UOB) American Univ. of Beirut Saint Joseph Univ. USJ	Lebanese Agricultural Research Institute (LARI) Lebanese National Council for Science Research (LCNRS)	
Sudan	Khartoum University Gezira university University Sudan	Nilain University	Agric. Res. Corporation Commission of Biotech & GE	Lina Tissue culture Co. Date Palm production Co. Kenana Sugar Co.
Syria	Tishreen University Aleppo University Damascus University ALU-Bath University		Ministry of Agric. & Agrarian Reform (MAAR) Atomic Energy Commission of Syria (AECS) General Commission for Biotech. (GCBT) Scientific Studies and Res. Center (SSRC) Arab Center for Studies of Arid and Dry Areas (ACSAD) International Center for Agric. Res. in the Dry Areas (ICARDA)	Green House Co. Scientific Council for Pharmaceutical Industries (SCPI)
Emirates	Date Palm Tissue Culture Lab. (DPTCL)		International Center for Biosaline Agriculture (ICBA) APRP/ICARDA Dubai Biotechnology and Research Park (DuBiotech)	Al Wathba Marionnet Green coast nurseries Al Rajhi Laboratory Advanced Biotech. Center (ABC), Dubai
Yemen	Sana'a University Aden University Taiz University Hadhramout University Hudaida University Dhamar University Ibb University		Agricultural Research and Extension Authority Ministry of Agriculture & Irrigation	YASAD YAPB

2.6. Table 4: Status of Biosafety Regulations

Country	(CPB) Cartagena Protocol on Biosafety	(CBD) Convention on Biological Diversity	Biosafety Regulatory Status (National Biosafety System)	Others
Jordan	✓ (Nov 2003)	✓ (1992)	✓	(SPS, TBT, TRIPS, Article XX of GATT) WTO agreement
Lebanon	✓ (Oct. 2008)	✓ (1994)	✓	NBSAP (1998), WTO agreement (accession in process)
Sudan	✓ (2005)	✓ (1985)	✓	
Syria	✓ (Apr. 2004)	✓ (1994)	✓	
UAE	✗	✗	✗	
Yemen	✗	✗	✗	

2.7. Table 5: Examples of GM Detection Applications

Country	Case			
	Targeted Genes	Detection Methods	Crop	Date
Jordan	CaMV 35S promoter	PCR	Some market food	2002
Lebanon	CaMV 35S promoter, NOS terminator, Cry genes	PCR	Corn	2007-2008
Sudan	CaMV 35S promoter, NOS terminator	PCR and RT-PCR	Corn Soybean	2007
Syria	33 different cases : • Lactin gene • 35S promoter • NOS terminator • Zein • invertase genes • bar gene • EPSPS gene • cry1A(b) • *npt*I gene • GUS gene	PCR and RT-PCR	Corn Soybean Barley Tomato Cucumber Sunflower	2007 (GCSAR)
UAE	Facilities for GMO detection are available, (No cases were reported)			
Yemen	No genetically modified crops or microorganism were imported, No facilities is available for production or detection of GMOs at present			

2.8. Findings and Recommendations

During discussions it was evident that the Arab states involved in this study recognize the importance of biotechnology, especially in regard to food trade. Special emphasis is placed on the cooperation with international organisations, such as FAO and WHO, and among the Arab States. The UAE, as well as other GCC countries, highlight their special situation as net food importers, and their need to be adequately equipped and prepared to test imported foods for their nature, quality and safety, indicating that current testing for GM foods in imported products is only sporadic and on a case by case basis. The use of analytical kits, particularly for the application of ELISA technique to GMO food detection is indeed well known, but further training on the proper application of these kits is needed. Furthermore, at least one laboratory should seek and obtain accreditation in GMO food analysis from an internationally recognized institution as this is important for international food trade.

It was also apparent that a monitoring and surveillance system should be put in place to check on the presence of GM foods in imported food shipments. Capacity building is urgently needed to strengthen the ability of Arab countries to control and test GM foods and foster research in the area of biotechnology. There is also a need to strengthen capacities both at regulatory and institutional level and to improve partnerships and dialogue at the regional level through strengthened technical, institutional, international cooperation on biotechnology and biosafety.

Moreover, the United a number of Arab countries are not signatory to the CPB so far and lack specific skills within its regulatory system. Indeed, currently, countries as single entities and the region as a whole cannot fully address the problems deriving from uncontrolled movements of GMOs in the area which could produce unpredictable effects on the regional biodiversity and human health.

The following gaps could be true and common among the Arab countries under study:

- Lack of full technical expertise in GMO detection and the evolving methodologies and practices;
- Lack of standardized procedures for the management of GMOs at various ports of entry;
- Lack of trained staff in GMOs detection and monitoring;
- Lack of equipment and containment facilities; and
- Lack of technical information or access to information in Arabic as a preferred language