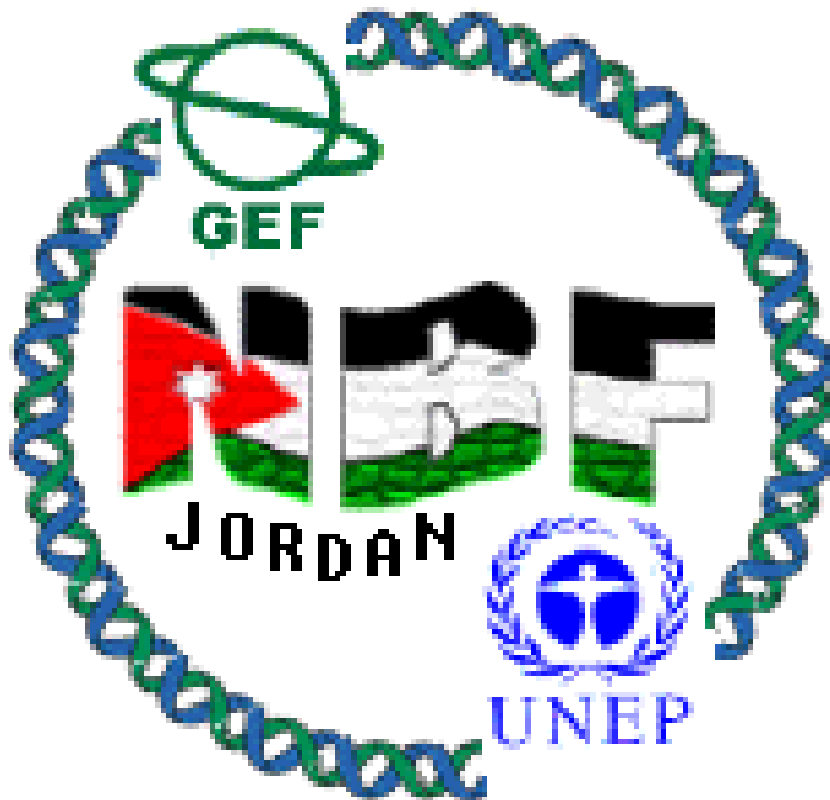


**The Hashemite Kingdom of Jordan**  
**Ministry of Environment**

**NATIONAL BIOSAFETY  
FRAMEWORK OF  
JORDAN**



**AUGUST, 2004**

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## **Acknowledgments**

**The National Biosafety Framework is the result of a collaborative and comprehensive effort undertaken by the Ministry of Environment and initiated by the former General Corporation for Environment Protection ( 1996 – 2002 ) with the extensive support of Jordanian experts representing the public, academic, and private sectors.**

**The National Biosafety Framework (NBF) was facilitated by the United Nations Environment Programme (UNEP) with funding from the Global Environment Facility (GEF).**

**The Ministry of Environment and the project team would like to acknowledge the support provided by the ministries and affiliated government authorities, non-governmental organizations, the Jordanian universities and the resource experts who have worked on the study.**

**Thanks and gratitude is also extended to Dr. Nizar Mohamed / regional coordinator for Asia-Pacific region for his support and facilitation during the study.**

## **Background**

The conference of the parties to the Convention on Biological Diversity adopted a supplementary agreement of the Convention known as the Cartagena Protocol on Biosafety on 29 January 2000.

The paragraph (g) of the Article (8) and the paragraphs (3) and (4) of the Article (19) of the convention on Biological Diversity have addressed the safety issues of biotechnology. The paragraph (g) of the Article (8) has required each contracting party to establish or maintain means to regulate, manage, or control the risks associated with the use and release of living modified organisms (LMOs) resulting from modern biotechnology which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risk to human health. The paragraph (3) of the Article (19) requests the parties to consider the need for and modalities of a protocol setting out appropriate procedures including, in particular, advanced informed agreement, in the field of the safe transfer, handling and use of any living modified organisms and their products.

The paragraph (4) of the Article (19) requires each contracting party to provide any available information about these LMOs. The chapter (16) of Agenda 21 (Environmental Sound Management of Biotechnology) requires that biotechnology be safely developed, applied, exchanged and

transferred through the agreed procedures for risk assessment and management.

To implement the International Guidelines for safety of biotechnology and help the developing countries strengthen their capacity building for biosafety management, the United Nations Environment Programme (UNEP) has selected around 100 countries for formulating the National Biosafety Framework by using the funds from Global Environment Facility (GEF).

The National Biosafety Framework is a combination of policy, legal, administrative and technical instruments that are developed to ensure an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking into account risks to human health.

Although National Biosafety Framework varies from country to country, they often contain a number of common components:

- A Government policy on biosafety
- A regulatory regime for biosafety
- A system to handle notifications or requests for authorization
- A system for follow up such as enforcement and monitoring for environmental effects
- Mechanisms for public awareness, education and participation

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## EXECUTIVE SUMMARY

Biotechnology is defined by the Convention on Biological Diversity (1992) as “any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use”. Also modern biotechnology is defined by the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2000) as "the application a) in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells, or b) fusion of cells beyond the taxonomic family".

The Jordan NBF was prepared by a small management team appointed by the Ministry of Environment in coordination with the Ministry of planning and in Consultation with UNEP. The project was assisted by a National Coordinating Committee representing members from different acting agencies and stakeholder groups. The Committee conducted three months meetings to discuss and approve the project work plan, project activities and assess progress. An international consultant was recruited to the development of legal and public participation components provide guidance for reports and documents, draft and finalize NBF. The selection of this consultant has been in consultation with the Regional Coordinator for Asia-Pacific Region.

The project team conducted a field survey regarding the national experts and the capacities of Jordanian institutes in the field of biotechnology. National consultants were appointed to develop a biosafety by-law. A core committee was appointed by the national coordinating committee to prepare the detailed term of reference for the following studies:

- Existing status of biotechnology, LMOs and programmes in Jordan.

- Relevant legislation to biotechnology and biosafety in Jordan, Mechanism for harmonization.

An announcement regarding to the announcement in the daily newspaper, eight applications submitted to the core committee. The core committee studied the applications and they decided that both studies going to Dr. Nabil Hailat and his group from Jordan Science and Technology University and Yarmouk University.

An awareness plan conducted by Mr. Ahmed Al-Rosan / Project Team was appointed to develop and implement an awareness campaign including a series of public and broad media coverage aiming at increasing the awareness and understanding the general public on Cartagena Protocol and its relation to environment and human health. Many brochure and newsletters and posters were produced by the project. Also an electronic site on the Internet page of the ministry shows all the information regarding to project were established.

Many workshops were conducted to synthesize the inputs from the consultants. The first workshop was targeted mass media staff. Three Conducted to discuss the draft of the by- law. Another two workshops were conducted to discuss the studies prepared by consultants. Four provincial

Training workshops in risk assessment and public participation were conducted in Amman, Irbid, Balqa and karak.

A national workshop was held in Amman on 22<sup>nd</sup> June 2004 whereby targeting representative from different government entities and non-government agencies including the academic and private sector to discuss the final draft of the NBF.

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## **Abbreviations**

- AEA:** Agricultural Engineering Association
- BAU:** Al-Balqa Applied University
- CBD:** Convention on Biological Diversity
- COP:** Conference of Parties
- HU:** Hashemite University
- GAFM:** General Association for Food Merchants
- GEF:** Global Environment Facility
- GAV:** General Association for Veterinary
- IUCN:** International Union for the Conservation of Nature
- JFU:** Jordanian Farmer Union
- JISM:** Jordan Institution for Standards and Metrology
- JUST:** Jordan University of Science and Technology
- LMO:** Living Modified Organisms
- MoE:** Ministry of Environment
- MoP:** Ministry of Planning
- MoA:** Ministry of Agriculture
- MoH:** Ministry of Health
- MoTI:** Ministry of Trade and Industry
- MU:** Mutah University
- NBC:** National Biosafety Committee
- NCARTT:** National Center for Agriculture Research and Technology Transfer
- RSCN:** Royal Society for the Conservation of Nature
- RSS:** Royal Scientific Society
- UoJ:** University of Jordan
- UNEP:** United Nation Environmental Programme
- YU:**Yrmouk University

# **1. INTRODUCTION TO THE BIOTECHNOLOGY IN JORDAN**

## **1.1 Current status of biotechnology in Jordan:**

Jordan is a food deficit country. With an annual growth rate 3.3%, the population of Jordan is expected to reach 7.1 million by the year 2010 and will exert heavy pressure on the fragile natural resources base of the kingdom. Total imports of food commodities still exceed exports by far so that Jordan is a deficit country with respect to food supply. In 1990, the deficit in agricultural trade balance was around JD342 million. Between 1990 and 1995, there was a slight decline, but the deficit remained around JD 300 million. In 1999, the agricultural trade deficit reached almost JD 350 million.

Similar to most other developing countries, biotechnology in Jordan attracts high attention but still in early development stages and behind the developed countries. There are some efforts in Jordan to catch up in this rapidly developing area, especially in the fields of medicine and agriculture. Several universities have recently established graduate and undergraduate programs in biotechnology or genetic engineering. Research program in universities or biotechnology centers are using basic biotechnology, immunology, and molecular biology techniques. There is also high research interest for and a limited production of immunological diagnostic kits and animal vaccines. Traditional biotechnology is being used in Jordan for the production of food, drink and yeast. Some work was conducted in the area of screening for organisms that have a potential biotechnological application. Plant tissue culture has attracted high attention from public and private sectors. Several university,

governmental and private research programs were conducted to optimize micro-propagation of plant tissues. Tissue culture has been used for in-vitro conservation and cryopreservation, production of disease-free plants, plant propagation, selection of biotic and a biotic tolerant stocks and production of secondary metabolites. Private and governmental laboratories commercially produce regenerated plants such as ornamental and cut flowers, date palm, potatoes and banana. Animal and human cell culture is mainly centered on medical and veterinary applications such as in-vitro fertilization and embryo culture.

## **1.2 Institutions and Programs Pertaining to Biotechnology and Biosafety**

### **1.2.1 Jordan University of Science and Technology**

The university has four faculties involved in biotechnology; faculty of veterinary medicine, faculty of science / department of molecular genetic and department of environment; faculty of agriculture and faculty of allied health science. In addition there are many master programs and research work conducted by the university.

### **1.2.2 Yarmouk University**

The department of biological science in the university is well established where several master thesis related directly or indirectly to biotechnology were finalized. Also, laboratories equipped for molecular biology work, immunology, etc.

### **1.2.3 Mutah University**

The university has two faculties that deal with biotechnology issues, faculty of science and faculty of agriculture. Both faculties offer courses in genetic engineering and molecular biology, etc.

### **1.2.4 Al-Balqa Applied University**

The department of biotechnology in the faculty of agriculture offers many courses in microbiology, genetic, tissue culture, and biotechnology. It has a laboratory for plant tissue culture in addition to two more laboratories, which are well equipped.

### **1.2.5 Hashemite University**

The department of biological science offers courses related to Microbiology, immunology, genetics, molecular biology and Biotechnology related subjects for undergraduate students.

### **1.2.6 Al-Albays University**

The department of biological science offers courses related to microbiology, genetics, molecular biology and other biotechnology related subjects. Some work on tissue culture is in its early stages.

### **1.2.7 University of Jordan**

The university has three faculties involved in biotechnology issues: faculty of science, faculty of pharmacy and faculty of agriculture. They offer a Bsc, Msc and PhD in biological science and pharmaceutical and agriculture. There are also many laboratories deal with plant tissue culture and some time for animal cell culture.

### **1.2.8 The Center for Agricultural and Research and Technology Transfer**

In 1990, a plant tissue laboratory was established for production of virus-free plants. Also, there was an emphasis on the production of apples and dates. The laboratory work was extended to the production of grapes, some types of flowers and citrus. At present time the laboratory works on the production of dates, salinatory tolerant potatoes, and the production of endangered plant species such as wild cherry. Furthermore, the center has developed a specialized laboratory on genetic engineering in 1997. The laboratory has facilities such as vertical gel technology, PCR, gel documentation system.

### **1.2.9 Ministry of Agriculture**

The work has been focused on micro-propagation of date palm and very little work has been done on propagation of endangered plant species like wild cherry.

### **1.2.10 The private sector**

Different companies in the private sector established plant tissue culture laboratories for the purpose of plant propagation, such as, Sukhtian Company, Abu-Qamar Company and Plant Tissue Culture Company.

## **1.3 Ongoing biotechnology-related research in Jordan**

Several research activities are going on in the country pertaining to biotechnology in agriculture. Some of these are related to tissue culture (of endangered species, dates, potatoes, wild almonds, etc), biological control (bacterial control of worms and insects on agricultural plants, grapes free

of diseases, diagnostic studies on the genetic polymorphism of the causes of pests, etc.), yeast and enzymes (plant by-products, enzyme production by bacteria, monoclonal antibodies for diagnosis, etc.), genetic engineering and their tests (finger printing of dates, GMOs, genetic differences in eggplants, etc.), veterinary medicine and animal production (use of hormones sponges, PCR on local goats, animal feed improvements, in vitro fertilization and embryo transfer, etc., and biofertilizers such as the uses of olive cakes for biogas production, dairy cattle manures for biogas production, etc. Research work is also going on the application of new technology for animal disease diagnosis such as PCR technology.

#### **1.4 Status of legislation on biotechnology and biosafety in Jordan**

Biotechnology and genetic engineering being a relatively new field with rapid and continuous developments, Jordan has not produced specific laws that regulate biotechnology or its biosafety. Regulating biotechnology, including biosafety during development, production and transport of LMOs, is clearly needed. Lack of such biotechnology regulation could complicate importing or local production of such products. In compliance with the Cartagena Protocol on Biosafety, Jordan needs to regulate biotechnology in terms of reducing risks on environment and human health. Such regulations could promote biotechnology by increasing public acceptance of new developments allowing companies to invest in the field of biotechnology in Jordan. Many authorities in Jordan are involved in protection of environment and human health, including:

#### **1.4.1 Ministry of Environment:**

Regarding the law No. 1 / 2003, the main tasks of the ministry are to set the general policies for the protection of environment and prepare the plans, programs, projects, measures and criteria and specifications for the elements of the environment, in addition to the supervision the public and private organizations and institutions.

#### **1.4.2 Ministry of Agriculture (law No 4 / 2002 temporary)**

The law was prepared very recently, it does not has any single article on living modified organisms or food, neither is a statement to mention LMOs. However, several articles stated the importance of human, animal and plant health in relation to plants and animals and their products. Furthermore, there are some definitions related to risk assessment, international criteria for sanitary and phytosanitary and their measures.

#### **1.4.3 The law for the protection of new plant species (No. 24/2000):**

This law related to the mechanism of registration of new plant species and the rights for the person(s) who invented it.

#### **1.4.4 Public health law (No. 21/1971):**

There are only some articles consider that food is false if the food contains any poisonous material or any substance that can be harmful to humans or animals.

#### **1.4.5 By-law on hygiene and food safety (No. 8 / 1994):**

In article 4/c, it is stated that the council has tasks to put the general policies on food safety, selling and handling of imported food. Article

4/c.2, 3, 4 and 5 are also important information for food biosafety where plans, research, cooperation in this regards can be performed.

#### **1.4.6 the law on descriptions and specifications (No.15/1994):**

In article 4, it is stated that Jordan Institution for Standards and Metrology/Ministry of Trade and Industry, will depend on a national system for description and specification based on recent scientific information. It also includes that the cooperation will work to provide environmental, economical and health protection for people of Jordan through the assurance that the commodities and other substances are compatible with the descriptive criteria.

#### **1.4.7 The by-law on health quarantine in Aqaba port (No. 32/1972):**

Article 46 states that it is not allowed freeing any shipment of food or the raw materials of food before it stands either by a certificate from the health department / source or by the laboratory testing that it is healthy and safe.

### **1.5 National Biotechnology Programs and Rosters of National Experts in Biotechnology and Biosafety:**

The information presented in this study regarding the names and specialization of experts in biotechnology and biosafety areas was collected in two ways:

- By distribution of the form prepared by UNEP;
- Collected from different electronic web sites of the universities in the country, or from different books and annual reports of universities, or by visitations and interviewing some of universities staff.

We also would like to emphasize that the list does not include every single person in the country who works in biotechnology, but it was for sure to attempt to have most of them if not all included. If some names are missing, it was without attention. Furthermore, the list of titles of master thesis below is not by any mean represents every single research work in the country in the area of biotechnology, but definitely it is a very good base.

The mechanism, which we think these names should be organized, is that by encouraging them to form a national association, where they present a short summary about their work. This could be stored in specialized site in a data base and at the same time could be published and distributed to the universities, ministries, national and some international institutions and organizations. The association can also publish a national journal or monthly newsletter where articles to warded to public education and awareness. Conferences, workshops, exhibitions should also be organized at different sites of the country with the ministries, universities and private sector.

More than 136 master theses have been conducted in different areas of biotechnology in the governmental universities. See the attached annex.

Also, there were two international conferences organized by the Higher Council for Science and Technology on biotechnology; one in 1989 and the second one in 1993. Furthermore, studies on the national scientific and technological requirements of the national institutions, the both private and governmental, for research and development, was studied and analyzed by the council in 1998. Three years ago, also, an international conference was organized in Al-Balqa University on technology. Also, governmental institutions, mainly at the universities, also organized more than 30 workshops on biotechnology in different specialization.

## **2. NATIONAL POLICY AND REGULATORY FRAMEWORK OF NATIONAL BIOSAFETY MANAGEMENT**

### **2.1 The Government Policy on Biosafety**

The Hashemite Kingdom of Jordan actively participated in the negotiations leading to the Convention on Biological Diversity, and considers one of the earliest countries signed it at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, in June 1992, and ratified it in 1993.

Also, Jordan has been participated in the intergovernmental negotiations of the Biosafety Protocol in the past few years, and signed it in October, 2000, and ratified it in November, 2003.

*The overall objective of Jordan policy on biosafety is to ensure that the risks likely to be caused by the products of modern biotechnology will be minimized to the level as low as possible and to protect human health, biodiversity and the environment in maximum way. Meanwhile, the Government will promote the sound and orderly research and development in the field of modern biotechnology and at the same time regulate the transboundary movement of the products resulting from biotechnology through establishing relevant policy and regulatory system and management bodies, Acknowledging that biotechnology has potential to aid sustainable development and that some GMOs may have negative impact on environment and human health.*

The main objectives for the government policy on biosafety and biotechnology are:

- ◆ To contribute to assuring an adequate level of protection in the field of safe transfer, handling and use of living modified organisms resulting from modern biotechnology;
- ◆ To ensure that the risks that may be caused by modern biotechnology and its product will be minimized and
- ◆ To provide maximum protection for human health and environment.

*The main priority actions for biosafety at the national level:*

- ◆ To improve a regulatory system of biosafety.
- ◆ To establish a technical system for risk assessment and management of LMOs, which includes the method and technical system for analyzing the potential risks of LMOs, the indicator system of risk assessment and the rules for classifying the risk levels, the technical guidelines for risk assessment, the technical specifications, procedures and guidelines for risk management and the indicator system and the procedures for the environmental monitoring of LMOs.
- ◆ To strengthen the scientific researches on biosafety
- ◆ To establish the system of biosafety monitoring which includes the operational mechanism of networking of biosafety monitoring, the risk monitoring tools and processing techniques, the environmental monitoring facilities for LMOs and specialized team for biosafety monitoring.
- ◆ To undertake publicity and education which will be focused on the development of biosafety films and videos and publication of books on biosafety, holding lectures, workshops and shows on biosafety and training of undergraduate and post graduate students in the field of biosafety.

◆ To undertake international cooperation with UNEP and other agencies, strengthening cooperation to learn more experience from other countries and work on more cooperative projects.

*Main principles for national biosafety system:*

◆ Encouraging research and development combined with the precautionary approach which means that the development of modern biotechnology and the trade of modern technology products will be promoted taking into full consideration the protection of environment, human health and biodiversity.

◆ The principle of prevention as priority which means that all the phases of modern biotechnology development will be strictly managed and all the potential risks reduced in the initial stage.

◆ Coordinating and cooperation between departments which means that the communication and coordination between different departments and disciplines will be strengthened.

◆ Adopting science-based management which means that risk assessment and management will be based on fully scientific evidence.

◆ Public participation which means that the public will be important players of biosafety management and supervision.

◆ promoting actively the international negotiations concerning biosafety protocol and other related international activities.

## **2.2 Regulatory Framework of National biosafety Management**

The government of Jordan has taken many initiatives to project its environment since the independence of the Kingdom in 1946. The government has also realized that an essential impute to the protection of environment is the issuance and enforcement of environment related laws.

Legislation and regulation pertaining to the environment have been adopted and enacted by the government of Jordan since 1950's. Present legislation and regulation include more than 250 articles related to environmental issues. A new environmental law (law 1/2003) was adopted, and regarding to it a new ministry of environment were established.

Based on the above information, we found we don't have any regulation in Jordan deal with LMOs or the biotechnology products direct, so we start to work on a regulation which can control transporting dealing and use of the LMOs product based on the Cartagena Protocol. A subcontract was done with national experts to draft the By-law to control dealing with biotechnology based on the ministry of environment law. Three workshops were organized to discuss the draft also another workshop was organized in presence of an international expert. The draft covers the following features: controlling transporting, dealing and using LMOs, labeling the LMOs products, a national committee to follow this by-law which they can establish any technical / advisory committees to do risk assessment for any LMOs products.

The national regulatory system of biosafety will be established according to the identified scope of By-law to govern various phases and areas of

modern biotechnology development to prevent their negative impacts on human health and environment. The experience in other countries and the experience and expertise available in international organizations will be drawn upon and the reality in Jordan taken into account to gradually improve the biosafety regulatory system. The components of the national regulatory system for biosafety will include:

- ◆ a national By-law on biosafety;
- ◆ a number of specialized regulations concerning biosafety; and
- ◆ a set of management procedural regulations, including institutional legislation concerning EIA, assessment procedures, and technical guidelines for assessment.

The first step in developing appropriate policies and procedures for the regulation of biotechnology is to establish a National Biosafety Committee (NBC) under the Ministry of Environment. The NBC should then move quickly to establish policies and procedures to govern the use of modern biotechnology and its products in Jordan.

### **3. NATIONAL BIOSAFETY COMMITTEE**

#### **3.1 National Biosafety Committee Members**

Ministry of Environment (Chair)

Ministry of Planning

Ministry of Health

Ministry of Agriculture

Ministry of Industry and Trade

Ministry of Finance-Customs

Two Universities nominated by the Chair

The National Center for Agriculture Research and Technology Transfer

General Organization for Food and Drugs

The Higher Council for Science and Technology

Agriculture Engineer Association

Jordan Veterinarians Association

The National Association for the Protection of the Consumers

Jordan Institution for Standards and Metrology

General Union for Farmers

General Association for Foodstuff Merchants

Two national experts nominated by the Chair

The Ministry of Environment will provide the Secretariat for the Committee.

### ***3.2 The main powers and activities of the National Biosafety Committee are to:***

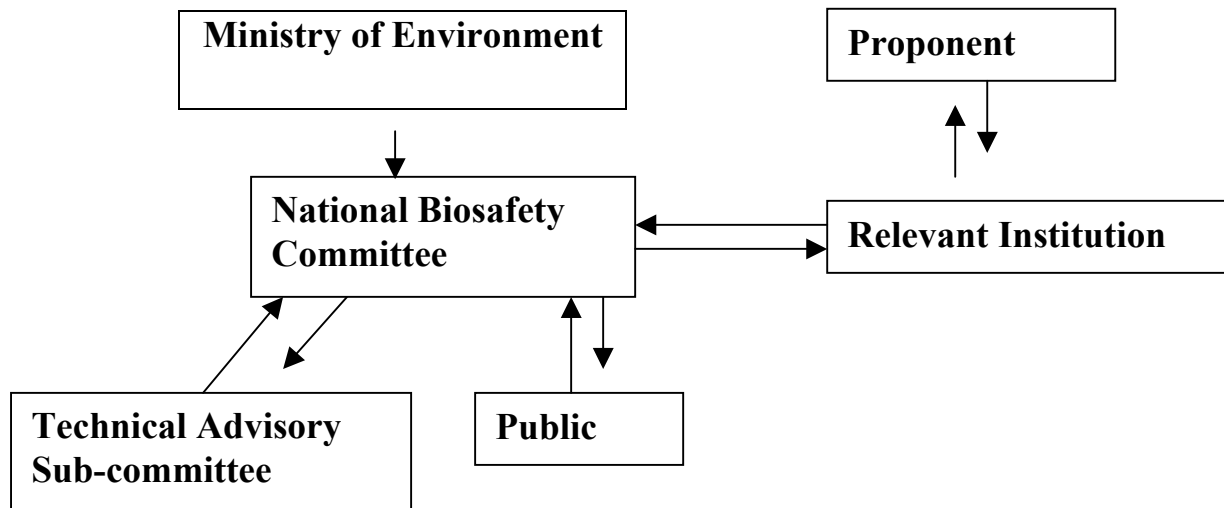
- ◆ formulate national biosafety policy and guidelines;
  - ◆ develop, execute and update national biosafety legislation and regulations;
  - ◆ approve or reject applications for importing, exporting and/or using LMOs and their products in the country;
  - ◆ co-ordinate the efforts of national authorities in the event of an emergency created by the release, whether intentional or unintentional, of a LMO into the environment, and/or of an unintentional transboundary movement of a LMO;
  - ◆ assist in building the capacity of governmental authorities and institutions that are responsible for biosafety and for the development of modern biotechnology in the country;
  - ◆ review all applications for import, export and/or domestic use of LMOs and their products;
  - ◆ periodically assess biosafety criteria and review decisions on import, export and/or domestic use of LMOs and their products;
  - ◆ monitor domestic handling and use of LMOs and their products and assure appropriate application of all procedures;
  - ◆ provide the national focal point for the Biosafety Clearing-house with all information on its decisions on import and domestic use of LMOs and their products and any other information required;
  - ◆ disseminate information on biosafety issues at the national level;
  - ◆ inform the public of planned releases of LMOs and their products, promote public participation in decision-making concerning GMOs, and generally promote public awareness of biosafety issues; and
  - ◆ report at least annually to the Government.

The NBC also may establish technical advisory sub-committees, as needed, to review all technical activities involving LMOs. These sub-committees may include:

- ◆ persons with expertise in R-DNA technology;
- ◆ persons with expertise in biological safety and physical containment;

◆ consultants knowledgeable in institutional commitments, policies and applicable law.

### 3.3 Proposed Procedure for Biosafety Framework of Jordan



### 3.4 System to handle notifications and requests for approval

Requests for permits to import, export, and/or carry out any domestic use of LMO and their products, including placing on the market, intentional introduction into the environment, field trials, contained use, and transit,) will be submitted to the line ministry responsible for the sector that is carrying out the activity involving the LMO. On receiving an application for a permit for any activity that involves LMOs, the receiving ministry will forward the application and all related documentation to the National Biosafety Committee (NBC). The NBC will order the risk assessment, as needed, and inform the responsible ministry if any additional information is required before making its decision.

The NBC may form a Technical Advisory Sub-committee for additional expert advice on any application. The NBC will also involve the public in the process of making decisions related to activities involving LMOs and their products in Jordan.

When the NBC has made its decision on whether or not to approve the activity, it will inform the relevant ministry, which will inform the proponent. If the NBC does not approve an application, the proponent may request the NBC to review its decision, based on new information that was not available at the time of the original application.

## **4. Monitoring and Enforcement**

### **4.1 Requirements for Monitoring**

Before we start any monitoring system, we have to take in consideration the following requirements:

- The objective of monitoring must be clear and well defined.
- The monitoring design must be based on the knowledge and experience, the receiving environment and release options of the monitored targets.
- The monitoring should be carried on throughout the release process and after the release.
- The time needed for the monitoring depends on the life cycle of LMOs and the rate of evaluation of the environment where they stay which is in general from 5 to 10 years or an extended period for the plants grown for several years.
- The monitoring of genetically modified plants should focus on the escape from LMOs to their wild relatives and whether a field monitoring is needed for some aspects of monitoring is determined by the biological characteristics of the receiving plants.

In choosing the method of monitoring, attention should be given to the flexibility, applicability, practicability, repetitiveness, uniqueness, investment cost, convenience and possibility for sampling and the limitation of the methods themselves.

The monitoring will be conducted on a case-by-case basis and different methods will be adopted for different LMOs and their different applications and procedures.

The user of LMOs, or independent government bodies, organizations and groups can conduct the monitoring, but an effective mechanism of supervision and management is needed.

In the process of monitoring, all the possible effective measures must be taken to control their accidental or harmful impacts on human health or environment once found and a timely report of such accidents or impacts will be submitted to the NBC at the higher level.

In Jordan, we still do not have any clear monitoring system. There are very important needs for effective monitoring system to deal with all kinds of LMOs.

## ***4.2 Technical Methods for Environmental Monitoring***

### ***For genetically modified plants***

*Direct observation:* this includes morphological identification, physiological identification, biochemical identification, microbiological identification, etc.

*Biological or Physical sampling and determination:* non- genetically-modified plants are planted around the genetically modified plants or the surrounding areas to prevent the scape of genetic modified blossoms or cut off the gene flow and measure the movement of blooms.

*Indirect method:* it can be used to measure the spreading of modified genes. These indirect methods are based on such a concept as being the distribution of gene types in the population used to infer the potential model of gene flow.

### ***For genetically modified animals***

*Sampling:* it means to capture from nature a certain population of natural species, which is used to test the escape of LMOs or modified genes.

*Testing genetically modified animals or identifying the transferred genes:* to identify the genetically modified animals or transferred gene, a mark must be used. The methods of marking are generally divided into artificial identification and genetic identification resulting from biological or genetic modification itself.

### ***For genetically modified microorganisms***

The main methods include board numeration, maximum possible numeration, microscopic examination, genetic identification, and nucleic acid techniques.

## **5. National Ability of LMOs Risk Assessment Studies in Jordan:**

### **5.1 Jordan Status and Trend on GMO:**

Jordan is one of the developing countries in the Middle East and has some ongoing projects in biotechnology. Most of the genetically improved organisms existed in the country are as a result of conventional traditional methods, for example genetically improved crop plants are available from the conventional breeding programs. To our knowledge very few studies are being conducted using the molecular biology technology (specifically recombinant DNA technology) to produce transgenic animals or plants. In addition Jordan is still working to have a license to conduct recombinant DNA technology research for the production of transgenic organisms. Many developing countries are importing genetically modified crops and are planted in their fields for trial and commercial use.

It is possible that Jordan may start to plan to import some genetically modified crops. One of the main objective of the current case study is to educate people in the country to be aware of the new technology and how to deal with such products and to seek for an appropriate guidelines, risk assessment and regulations of all issues concerning GMOs.

Since no risk assessment guidelines have been approved yet officially, certain act regulations and guidelines should be considered and hopefully

adopted in the near future. In the past, several committees have been formed in the Ministry of Agriculture to put guidelines and outlines for Biotechnology and Biosafety. Also, several committees were formed in the universities and the Ministry of Health for biotechnology and again nothing significant has been concluded. Lately, a national committee was made by the Prime Minister and headed by the Minister of Agriculture to put again guidelines for genetically modified food and nothing

## **5.2 Constraints in Implementing LMO Risk Assessment:**

In Jordan, human resources and infrastructure for biotechnology and biosafety and more specifically for risk assessment of GMFs is limited in spite of the long list of experts and many research work represented by the master theses shown in Annex I and II. However, there is an increasing interest by some institutions to train the staff in relevant discipline and equip their laboratories to increase its research potential in biotechnology. The constrains can be summarized as follows:

1. Shortage of highly trained manpower: the human resources are scattered in different universities, departments and centers. The scientists in the universities are busy, in most of the times, with research related to their promotion. There is no critical mass of scientists in the different lines of sciences and technology such as molecular biology, breeding, ecology, risk assessment and management.
2. Limited institutional capacity for training in biotechnology: lack of high technological equipment.
3. Lack of appropriate research environment and brain drainage.
4. Lack of basic organized information, required data and many essentials techniques.

5. Lack of sufficient participation of the private sector in research support and activities
6. Lack of national biosafety guidelines
7. Insufficient funding: Biotechnology requires expensive and updated equipment.
8. Inadequate of awareness on the importance and potential use and application of biotechnology and the related safety.
9. Inadequate national systematic policy, strategies and structures.
10. Inadequate institutional collaboration and consultation in biotechnology resulted in dilution of the human resources.
11. Lack of sustainability and long term planning.

## **6. Public awareness, education and participation**

### **6.1 Background**

Informing the public and encouraging their participation about the potential risks to biodiversity associated with the international movement of LMOs, is one element of a suite of international efforts to meet the broad objectives of the Convention on Biological Diversity. These are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

To inform and consult the public about LMOs directs economic benefits as well as potential social and environmental benefits. For example, crops, which have been genetically modified to be pest resistant, reduce the use of pesticides that could have deleterious effects on the environment or human health. Use of these crops also reduces the material and financial inputs needed to raise them. Similarly, the development of herbicide tolerant crops has promoted sustainable agricultural practices. In turn this has resulted in increased crop yields

and a reduction in both soil moisture loss and topsoil erosion. Outside traditional agriculture, the use of plants and bacteria specifically engineered to extract or break down pollutants can allow contaminate lands to be safely returned to productive use.

The public must be able to access the flow of information to assist countries in weighing the potential benefits against the potential risk that imported LMOs may pose to their biodiversity. The primary concerns expressed over LMOs are: 1) that their ability to pass on their modified genetic material may lead to the transfer of that material to native species which may lead to a decrease in genetic diversity, and; 2) that introduced LMOs may out-compete native species. This is of particular concern in *centers of origin* and *centers of diversity*. Respectively, these are areas that contain the wild relatives from which commercially important varieties of crops such as wheat, corn or potatoes have been derived, and areas with very high levels of biodiversity.

Species should be conserved, whether recognized for their commercial importance or not. Each has value in its own right as part of the broad mosaic of global biodiversity and as key components in the functioning of the ecosystems from which we derive economic, social and environmental benefits. The products and services of these ecosystems are particularly important to many native and indigenous populations.

In addition, commercially or culturally important species, along with potentially countless other plant, animal and microorganism species have immense value in terms of the "bank" of genetic material that they represent, not all of which has been characterized. The conservation of this genetic raw material is a key goal of the Convention on Biological

Diversity and is clearly important for the environment and sustainable development, to industries such as agriculture, forestry, health and fisheries as well as to those specifically engaged in the development of biotechnology products.

It is also in the interests of developing countries to protect their biodiversity, as they are collectively the world's greatest storehouse of genetic diversity. This raw material is a potentially important source of revenue for these countries, either through the sale of rights to harvest and utilize genetic material or as raw material in developing their own products of biotechnology for export or domestic use.

## **6.2 Who is the public?**

The public is not only the individual citizens, but includes a wide range of groups and individuals who may be interested or affected by the introduction of Cartagena convention into force. Stakeholders are another term used to mean public, which means individuals, and organizations that have a stake in the convention or interested in it. One should know that public participation means the same as public consultation or public involvement, which all mean the inclusion of members of the public in government, private sector and the civil society in decision making. The main purpose of public participation is to allow the public to express concerns about, or support for, a project and to improve decisions about the design, sitting and operation of that project, based on a public input. Therefore, public participation is meant to improve decisions about the Convention of Biosafety based on the public input in the process and all the requirements mentioned in article 23 of the convention.

Public is divided into the following categories as follows:

► ***Community***

- ◆ Affected people: they are the people who are going to be affected by the convention whether the impact positive or negative.
- ◆ Environmental Non-governmental Organizations and unions (farmers) who are the groups interested in the ecology, health and socioeconomic aspect of the issue. These groups have history and accumulation expertise where they can provide the assist the government to reach its objectives. They also can advise on community values and help reach the affected communities.
- ◆ Community leaders such as the politician, religious, professional associations and clubs.
- ◆ Municipalities that include the mayors, council members and directors and staff
- ◆ Media, which is in a position to inform other members of the public about the convention and its aspects in addition to its ability to gather information from the public on the issue.
- ◆ Academics and researchers who are excellent source of information and expertise.

► ***Government***

- ◆ Government agencies that are working as part of the process to implement the convention.
- ◆ Government agencies whose activities are affected by the implementation of the convention

► ***Private sector***

- ◆ Business and industry: this sector may be affected by the convention positively or negatively. This sector also has expertise that can help in the implementation process.

- ◆ Investors or business partners who may base on the implementation of the convention open business or invest.

► *International and bilateral organizations*

- ◆ International donors

- ◆ International non-governmental organizations, which are, interested in Jordan's biodiversity and biosafety issues.

### **6.3 Reasons for involving the public**

One of the most important benefits of involving the public is to help link environmental impacts of the convention to impacts on people. The implementation of the convention must discuss and identify the biophysical and ecological impacts and analyze how these changes in the natural systems affect the public.

Also the discussion should touch on and analyze the convention socio-economic impacts, including effects on people's health, family life, recreation and quality of life, economic activities, and land uses.

The public can help to identify and analyze these impacts, the links between environmental impacts and people, may propose mitigation measures and

could help to monitor the impacts. There are three main reasons to involve the public in the implementation of the biosafety convention as follows:

- Moral reasons: in a democratic society, citizens have a right to be involved in plans that affect their interests.

- Legal reasons: the national legal system is constructed in a way that requires community involvement apart from the fact that if a donor

organization is involved through providing funds, their internal legal regulations require community involvement to avoid gaining negative images instead of having positive one. Moreover, the convention is its article 23 calls all parties to raise public awareness and encourage their participation.

- Practical reasons: community participation can improve the quality of the convention implementation as well as improving the image of the government being transparent to its own public.

#### ***6. 4 Benefits of public participation***

- The public will influence decisions about the convention that affect them.

- Government will have a better decision on the convention implementation and will help improve the convention implementation and increase public acceptability of the convention.

##### ***a. Benefits to the public***

- Get information about the convention which may affect them or their interest

- Provide environmental, health and socioeconomic information, expertise and local traditional knowledge about the environmental setting.

- Present views, concerns, values so that the government can address them

- Influence the convention implementation to be implemented in a positive way.

- Minimize negative effects on local populations

- Maximize local benefits from the convention implementation.

- Ensure the legal, moral and practical equipment for community involvement.

### ***b. Benefits to the government***

- Identify community values and priorities
- Identify main public concerns about the convention implementation and the environmental values.
- Identity convention benefits for the public
- Ensure no issues are overlooked.
- Avoid unnecessary controversy and conflict about the convention.
- Avoid unnecessary costs or damage from wrong decisions or incomplete information.
- Identify problems that could threaten the implementation.
- Get public involved in the implementation and monitoring.
- Increase accountability to the public for decisions about the resources
- Promote community development and improvement
- Promote democratic values and increase citizen's participation skills

### **6.5 Levels of public participation**

To involve community, there are three different levels participation as follows:

- Informing the community about the convention that aims at educating the public and make them aware of the convention and related issues. The best techniques used to inform the public include printed materials (brochures, newsletters, posters), information centers, press information, radio, site visits or field trips, exhibitions or open houses and information hotline or key contact person and media.
- Consulting the community, which seeks to gather ideas, suggestions and information from the public and other stakeholders on the issue. The best techniques used are public meetings, workshops, and presentation to

community organizations, individual interviews or surveys, focus groups or groups interview, and technical assistance to public.

■ Shared decision or responsibilities through involving communities who their responsibilities are sought in the decision making process. The best techniques used are forming advisory groups and monitoring committees.

### ***6.6 Public participation keys of success***

■ Public should see results as output to its participation.

■ The value of community participation should not be an add-on just to meet the requirements.

■ Results of consultation should be reflected and integrated in the national legal system of biosafety.

■ Identify how the public comments will be addressed.

■ Use specific techniques to ensure women, youth and the illiterate participation.

■ Community should have access to all information pertinent to the issue under consideration.

■ The process of community involvement must be clear, open, neutral and fair and open to any one who is interested.

■ Public should have feedback on how their contributions are used in decision-making process.

■ Sufficient relevant information must be provided in a form that is easily understood by non-experts with being simplistic.

■ Sufficient time must be allowed for public to read, discuss and consider information and its implication.

■ Sufficient time must be allowed to enable public to present their views.

■ Responses should be provided to issues / problems raised or comments made by public. This enables public confidence in the public involvement.

- The selection of venues and the timing of events should encourage maximum attendance and a free exchange of views by public including those that may feel less confident about expressing their views.
- Consider the proper time that favors poor so that not to keep them away from income – producing tasks, and thus favors the wealthy.
- Plan carefully the settings as increased distances make communication more difficult and expensive.
- Careful consideration for the local values and culture as behavioral norms or cultural practice can inhibit involvement of some groups, who may not feel free to disagree publicly with dominant groups.
- Involve all those likely to be affected, or have a stake in the matter;
- Communicating the objectives of the convention, and how it is planned to achieve them;
- Actively listening to the concerns of affected people, and the interests, which lie behind those concerns;
- Treating people honestly and fairly, establishing trust through a consistency of behavior;
- Being flexible in the way alternatives are considered, and amending the what is in mind wherever possible to better suit the interests of the other parties;
- Where other's interest cannot be accommodated, mitigating impacts to the greatest extent possible, and looking for ways to compensate for detriment;
- Establishing and maintain open two-way channels of communication throughout the planning phase, and beyond into implementation;
- Acknowledging the concerns and suggestions of others, and providing feedback on the way these matters have been followed up and evaluated.

## ***6.7 Mechanisms for public participation***

*The public should be involved in three areas:*

- ▶ Building public awareness
- ▶ providing public information on biosafety
- ▶ Encouraging public input into decision making on GMO activities and use.

### ***Building public awareness:***

*Use existing awareness-building structures like*

- specific media programmes/publications
- public education/guidance offices in government departments
- NGOs
- Publications of professional and civil society organizations
- Labeling, where feasible and practical

*Use various methods for outreach such as:*

- publications, TV, radio
- seminars
- workshops
- school curricula
- exhibitions
- links on ministry website to approved education sites

### ***Providing public information on biosafety***

*Use existing channels where feasible:*

- the national information centre
- department of awareness and public relation in the ministry and other ministries

- official monthly gazette
- media announcement (TV, radio, print)
- website

***Encouraging public input into decision making on GMO activities and use***

*Invite comment by:*

- creating or using an established database of interested and affected parties
- Publishing a notice in a local newspaper
- Provide a response button on a website.

## **ANNEXES**

**ANNEX 1: DRAFT OF THE BY-LAW**

**ANNEX 2: ROSTERS OF NATIONAL EXPERTS**

**ANNEX 3: SUMMARY OF THE STUDIES CARRIED BY THE  
PROJECT**

## ANNEX 1

### **Proposed By-Law for Biosafety of Genetically Modified Organisms Issued in Accordance with Article No (23) of the Law of Environment No (1) for the Year ( )**

#### **Article 1: General provisions**

A. This By-law is issued in accordance with Article No. (23) of the Law of Environment No. (1) for the Year ( ).

B. This By-law is valid for implementation from the date of its publication in the Official Gazette.

#### **Article 2: Use of terms**

For the purpose of this By-law, the following expressions and words shall have the

meanings assigned to them below, unless otherwise specified:

1. *Government* means the national government of Jordan.
2. *Ministry* means the Ministry of Environment.
3. *Minister* means the Minister of Environment.
4. *Committee* means the National Biosafety Committee that is established by this By-law.
5. *Technical Advisory Sub-Committee* means an *ad hoc* sub-committee formed by the Committee as required.
6. *Biodiversity* means the variability among living organisms from all sources, including diversity within species, between species and of ecosystems.
7. *Biosafety* means efforts to reduce and/or eliminate the potential risks resulting from modern biotechnology and its products.
8. *Biotechnology* means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for a specific use.
9. *Contained use* means any operation, undertaken within a facility, installation or other physical structure, which involves living modified organisms that are controlled by specific measures that effectively limit their contact with, and their impact on, the external environment.
10. *Export* means any transboundary movement of a LMO from Jordan into another country.
11. *Exporter* means any legal or natural person under the jurisdiction of Jordan who applies for a permit to export a living modified organism or their products from Jordan and/or arranges for the export.

12. *Genetically modified organism (GMO)* means an organism resulting from the use of biotechnology.
13. *GMO products* means processed products containing dead modified organisms or non-living genetically modified components.
14. *Import* means any transboundary movement of a living modified organism or their products into Jordan from another country.
15. *Importer* means any legal or natural person under the jurisdiction of Jordan who applies for a permit to import a living modified organism or their products from Jordan and/or arranges for the import.
16. *Living modified organism (LMO)* means any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology.
17. *Living organism* means any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids.
18. *Modern biotechnology* means the application of *in vitro* nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection.
19. *Proponent* means any legal or natural person that applies for a permit for any type of domestic use and/or release of LMOs and their products in Jordan.
20. *Release* means the introduction of a living modified organism for field trials or commercial use in Jordan.
21. *Risk assessment* means identifying potential risk, estimating the likelihood that the risk will occur, and estimating how much damage would be caused if the risk does occur.
22. *Risk management* means methods used to reduce identified potential risk to an acceptable level.

### **Article 3: Principles**

A. All import into, export from, and use of LMOs and their products in Jordan are subject to regulation by the Committee.

B. Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity, taking also into account risks to human health, shall not prevent the National Biosafety Committee from making a decision with regard to the import of a living modified organism in order to avoid or minimize potential adverse effects.

#### **Article 4: Scope**

A. This By-law applies to the transboundary movement, transit, handling and domestic use of all living modified organisms and their products that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health.

B. This By-law does not apply to LMOs that are:

1. Intended for use as pharmaceuticals for humans and that are controlled by international agreements or international organizations;
2. In transit;
3. Intended for contained use; and
4. Any other categories of LMOs that may be exempted by the Committee.

#### **Article 5: Objectives**

The objectives of this By-law are to:

1. Contribute to assuring an adequate level of protection in the field of safe transfer, handling and use of living modified organisms resulting from modern biotechnology;
2. Ensure that the risks that may be caused by modern biotechnology and its products are minimized; and
3. Maximize protection for human health and the environment in Jordan.

#### **Article 6: Establishment of the National Biosafety Committee**

A. A National Biosafety Committee chaired by the Minister is established. Its members will be specialists from:

1. Ministry of Environment
2. Ministry of Health
3. Ministry of Planning
4. Ministry of Agriculture
5. Ministry of Industry and Trade
6. Ministry of Finance-Customs
7. Two national universities with facilities involving modern biotechnology
8. The National Center for Agriculture Research and Technology Transfer
9. General Organization for Food and Drugs
10. The Higher Council for Science and Technology
11. Agriculture Engineer Association
12. Jordan Veterinarians Association

13. The National Association for the Protection of the Consumers
14. Jordan Institution for Standards and Metrology
15. General Union for Farmers
16. General Association for Foodstuff Merchants
17. Two national experts designated by the Minister.

The members indicated in items 7 and 16 shall be designated for a period of two (2) years, at the end of which period they will be replaced by new members in the same categories, as designated by the Minister.

- B. The Minister is the National Focal Point for biosafety.
- C. The Ministry serves as the Secretariat for the Committee.
- D. The Committee will meet once a month and whenever it is needed. Fifty per cent (50%) of the Committee members present at a meeting constitute a quorum. The Committee will adopt its rules of procedure and issue them in the form of a regulation.
- E. The Committee may form Technical Advisory Sub-Committees as required.

#### **Article 7: Powers and tasks of the National Biosafety Committee**

In order to realize the objectives of this By-law, the Committee shall, in co-ordination and with the co-operation of the related authorities, have the following powers and perform the following tasks.

- A. The powers of the Committee are to:
  1. Formulate national biosafety policy and guidelines;
  2. Develop, execute and update national biosafety legislation and regulations;
  3. Approve or reject applications for importing, exporting and/or using LMOs and their products in the country;
  4. Co-ordinate the efforts of national authorities in the event of an emergency created by the release, whether intentional or unintentional, of a LMO into the environment, and/or of an unintentional transboundary movement of a LMO; and
  5. Any other power that may be delegated by the Government.
- B. The tasks of the Committee are to:
  1. Assist in building the capacity of governmental authorities and institutions that are responsible for biosafety and for the development of modern biotechnology in the country;

2. Review all applications for import, export and/or domestic use of LMOs and their products;
3. Periodically assess biosafety criteria and review decisions on import, export and/or domestic use of LMOs and their products;
4. Monitor domestic handling and use of LMOs and their products and assure appropriate application of all procedures;
5. Provide the national focal point for the Biosafety Clearing-house with all information on its decisions on import and domestic use of LMOs and their products and any other information required;
6. Disseminate information on biosafety issues at the national level;
7. Inform the public of planned releases of LMOs and their products, promote public participation in decision-making concerning GMOs, and generally promote public awareness of biosafety issues;
8. Report at least annually to the Government; and
9. Any other task that may be delegated by the Government.

**Article 8: Import**

A. The first import of a LMO for intentional introduction into the environment shall be subject to risk assessment and advance informed agreement by the Committee.

B. The application for permission to import a LMO for intentional introduction into the environment shall at a minimum include the information specified in Appendix 1 to this By-law.

C. The first import of a LMO for direct use for food feed or for processing is subject to risk assessment and prior approval by the Committee.

D. The application for permission to import a LMO for direct use for food, feed or for processing must at a minimum include the information specified in Appendix 2 to this By-law, the accuracy of which must be certified in writing by the competent national authority of the country of export.

E. The proponent shall carry out the risk assessment according to the guidelines in Appendix 3 to this By-law and shall bear all related costs.

F. On receipt of an application for a permit to import a LMO, the receiving ministry shall forward the application and all related documentation to the Committee for review.

G. The Committee may request additional information, grant approval with or without risk management conditions, or not approve the application. The Committee shall, in writing, inform the forwarding ministry of its decision. If the Committee requests additional information, it shall specify in writing the additional information required. If the Committee does not approve the application, it shall provide a written explanation of its reasons for doing so.

H. The written approval issued by the Committee shall form an integral part of the import permit for any LMO for intentional introduction into the environment or for direct use for food, feed or for processing.

I. When the Committee approves the import of a LMO for direct use for food, feed or for processing, it shall, within fifteen (15) days, transmit its decision to the national focal point for the Biosafety Clearing-house along with the information specified in Appendix 2 to this By-law.

#### **Article 9: Export**

A. The export of any LMO from Jordan for intentional introduction into the environment of the country of import is subject to prior written authorization by the competent national authority in the country of import, which shall form an integral part of the application for the export permit.

B. An exporter of LMOs must secure in advance from the Committee any certification that may be required by the competent national authority in the country of import.

#### **Article 10: Risk management**

A. The establishment of any facility and/or the initiation of any activity involving contained use, intentional introduction into the environment, and/or direct use as food or feed or for processing of GMOs in Jordan are subject to prior approval by the Committee. Prior approval may include a risk assessment, at the discretion of the Committee.

B. On receipt of an application for a permit to operate a facility or initiate an activity involving contained use, intentional introduction into the environment, and/or direct use as food or feed or for processing of GMOs, the receiving ministry shall forward the application and all related documentation to the Committee for review.

C. The Committee may require a risk assessment, request additional information, grant approval with or without risk management conditions, or not approve the application. The Committee shall, in writing, inform the

forwarding ministry of its decision. If the Committee requests additional information, it shall specify in writing the additional information required. If the Committee does not approve the application, it shall provide a written explanation of its reasons for doing so.

D. The written approval issued by the Committee shall form an integral part of the permit for operating the facility or initiating the activity.

E. National universities and research institutions may apply for a general permit for their facilities and activities, subject to monitoring by and periodic reporting to the Committee.

F. Risk management measures which domestic facilities and activities may be required to put in place include, but are not limited to, establishing:

1. Mechanisms for internal safety monitoring;
2. Safeguards to prevent an unintentional release;
3. Safeguards to prevent an unintentional transboundary movement;
4. Procedures for post-release treatment and control;
5. Procedures for immediate notification and emergency response in the event of an unintentional release;
6. Mitigation plans in the event of an unintentional release or unforeseen consequence of an intentional release;
7. Any other measure that the Committee, in cooperation with the related authorities, may require.

G. Procedures for handling and transport of LMOs and their products in Jordan and for monitoring and inspection of facilities and activities involving LMOs and their products in Jordan shall be established by regulations issued by the Committee in cooperation with the related authorities.

H. Facilities and activities existing or being carried out prior to the adoption of this By-law shall be brought into compliance with its provisions within a period to be determined by the Committee and issued as a regulation.

#### **Article 11: Confidential information**

An importer, exporter, or proponent of domestic use of LMOs and their products may request that specified information be treated as confidential. If the Committee accepts the request, it shall not use or permit the use of information accepted as confidential without the written consent of the importer, exporter or proponent. If the Committee rejects the request, it

shall provide a written explanation for its decision prior to disclosing the information.

### **Article 12: Review of decisions**

A. When the Committee does not approve an application or request under articles 8, 9, 11, and 12 of this By-law, the importer or proponent may request the Committee to reconsider its decision, based on new information not available at the time the original application or request was submitted.

B. The Committee may, at its discretion, review its decisions on import and/or domestic use of LMOs in light of new information available and/or changed circumstances. In the event that the Committee revises a prior decision, it shall notify the national focal point for the Biosafety Clearing-house and the importer and/or proponent, as appropriate.

### **Article 13: Labeling and identification**

Any importer, exporter, or proponent of the domestic use of LMOs and their products must label each consignment as follows:

A. For direct use as food or feed or for processing – clearly identify that the whether the consignment does or does not contain LMOs and that they are not intended for intentional introduction into the environment;

B. For intentional introduction into the environment – specify the identity and relevant characteristics of the LMO and any requirements for its safe handling, transport, use, and storage, specify the contact point for further information, and state that the transboundary movement is in conformity with the requirements of the Cartagena Protocol that are applicable to the exporter;

C. For contained use – clearly identify the LMO, specify any requirements for its safe handling, transport, use and storage, and specify the contact point for further information including the name and address of the individual and the institution to which the LMO is consigned; and

D. Any additional identification that the Committee may require.

### **Article 14: Emergency response**

A. In the event of an unintentional release or transboundary movement of a LMO or in the event of an unforeseen consequence of intentional use of a LMO, any person with knowledge of the emergency shall immediately inform the local authorities who shall immediately notify the Committee.

- B. On receiving notification of an emergency involving LMOs, the Committee shall:
1. Take immediate steps to inform the appropriate national and local authorities;
  2. Co-ordinate the actions of all relevant national and local authorities, according to an emergency response plan issued by the Ministry as a regulation;
  3. Inform the national focal point for the Biosafety Clearing-house and the competent national authorities in potentially affected States.

**Article 15: Public participation, information, and public awareness**

A. The Committee shall ensure the meaningful participation of the public in the process of making decisions concerning the import and domestic use of GMOs.

B. The Committee, in cooperation with the related authorities, shall ensure public access to non-confidential information related to GMOs in general, and in particular to their presence and use in Jordan.

C. The Committee, in cooperation with the related authorities, shall develop and implement strategies, programmes and activities designed to increase public awareness of GMOs in general, and in particular of their presence and use in Jordan.

**Article 16: Regional cooperation**

Jordan may enter into agreements for regional cooperation in any field related to GMOs, particularly with respect sharing information and building capacity to manage GMOs.

**Article 17: Violations**

A. Any violator of the provisions of this By-law shall be sanctioned according to the penalties provided in the Law for Environment No. (1), Year 2003.

B. In the event of illegal transboundary movement of a LMO into Jordan, in addition to any sanctions that may be applied under paragraph A above, the Committee may request the competent authority in the country of export, at its own expense, to dispose of or destroy the illegally transported LMO, or send it back to the country of origin under controlled and safe conditions.

**Article 18: Repeal of inconsistent provisions**

This By-law repeals any prior legal provisions not consistent with it.

### **Information Required in Applications for Permission to Import LMOs for Intentional Introduction into the Environment**

1. Name, address and contact details of the exporter.
2. Name, address and contact details of the importer.
3. Name and identity of the living modified organism, as well as the domestic classification, if any, of the biosafety level of the living modified organism in the State of export.
4. Intended date or dates of the transboundary movement, if known.
5. Taxonomic status, common name, point of collection or acquisition, and characteristics of recipient organism or parental organisms related to biosafety.
6. Centres of origin and centers of genetic diversity, if known, of the recipient organism and/or the parental organisms and a description of the habitats where the organisms may persist or proliferate.
7. Taxonomic status, common name, point of collection or acquisition, and characteristics of the donor organism or organisms related to biosafety.
8. Description of the nucleic acid or the modification introduced, the technique used, and the resulting characteristics of the living modified organism.
9. Intended use of the living modified organism or products thereof, namely, processed materials that are of living modified organism origin, containing detectable novel combinations of replicable genetic material obtained through the use of modern biotechnology.
10. Quantity or volume of the living modified organism to be transferred.
11. A previous and existing risk assessment report consistent with Appendix 3.
12. Suggested methods for the safe handling, storage, transport and use, including packaging, labeling, documentation, disposal and contingency procedures, where appropriate.
13. Regulatory status of the living modified organism within the State of export (for example, whether it is prohibited in the State of export, whether there are other restrictions, or whether it has been approved for general release) and, if the living modified organism is banned in the State of export, the reason or reasons for the ban.
14. Result and purpose of any notification by the exporter to other States regarding the living modified organism to be transferred.
15. A declaration that the above-mentioned information is factually corrects.

### **Information Required Concerning Living Modified Organisms Intended for Direct Use as Food or Feed, or for Processing**

1. The name and contact details of the applicant for a decision for domestic use.
2. The name and contact details of the authority responsible for the decision.
3. Name and identity of the living modified organism.
4. Description of the gene modification, the technique used, and the resulting characteristics of the living modified organism.
5. Any unique identification of the living modified organism.
6. Taxonomic status, common name, point of collection or acquisition, and characteristics of recipient organism or parental organisms related to biosafety.
7. Centres of origin and centers of genetic diversity, if known, of the recipient organism and/or the parental organisms and a description of the habitats where the organisms may persist or proliferate.
8. Taxonomic status, common name, point of collection or acquisition, and characteristics of the donor organism or organisms related to biosafety.
9. Approved uses of the living modified organism.
10. A risk assessment report consistent with Appendix 3.
11. Suggested methods for the safe handling, storage, transport and use, including packaging, labeling, documentation, disposal and contingency procedures, where appropriate.
12. A declaration that the above-mentioned information is factually corrects.

## **Risk Assessment**

### **Objective**

1. The objective of risk assessment is to identify and evaluate the potential adverse effects of living modified organisms on the conservation and sustainable use of biological diversity in the likely potential receiving environment, taking also into account risks to human health.

### **Use of risk assessment**

2. Risk assessment is to be used by the Committee to make informed decisions regarding living modified organisms.

### **General principles**

3. Risk assessment should be carried out in a scientifically sound and transparent manner, and can take into account expert advice of, and guidelines developed by, relevant international organizations.

4. Lack of scientific knowledge or scientific consensus should not necessarily be interpreted as indicating a particular level of risk, an absence of risk, or an acceptable risk.

5. Risks associated with living modified organisms or products thereof, namely, processed materials that are of living modified organism origin, containing detectable novel combinations of replicable genetic material obtained through the use of modern biotechnology, should be considered in the context of the risks posed by the non-modified recipients or parental organisms in the likely potential receiving environment.

6. Risk assessment should be carried out on a case-by-case basis. The required information may vary in nature and level of detail from case to case, depending on the living modified organism concerned, its intended use and the likely potential receiving environment.

### **Methodology**

7. The process of risk assessment may on the one hand give rise to a need for further information about specific subjects, which may be identified and requested during the assessment process, while on the other hand information on other subjects may not be relevant in some instances.

8. To fulfill its objective, risk assessment entails, as appropriate, the following steps:

(a) An identification of any novel genotypic and phenotypic characteristics associated with the living modified organism that may have adverse effects on biological diversity in the likely potential receiving environment, taking also into account risks to human health;

- (b) An evaluation of the likelihood of these adverse effects being realized, taking into account the level and kind of exposure of the likely potential receiving environment to the living modified organism;
- (c) An evaluation of the consequences should these adverse effects be realized;
- (d) An estimation of the overall risk posed by the living modified organism based on the evaluation of the likelihood and consequences of the identified adverse effects being realized;
- (e) A recommendation as to whether or not the risks are acceptable or manageable, including, where necessary, identification of strategies to manage these risks; and
- (f) Where there is uncertainty regarding the level of risk, it may be addressed by requesting further information on the specific issues of concern or by implementing appropriate risk management strategies and/or monitoring the living modified organism in the receiving environment.

### **Points to consider**

9. Depending on the case, risk assessment takes into account the relevant technical and scientific details regarding the characteristics of the following subjects:

- (a) Recipient organism or parental organisms. The biological characteristics of the recipient organism or parental organisms, including information on taxonomic status, common name, origin, centers of origin and centers of genetic diversity, if known, and a description of the habitat where the organisms may persist or proliferate;
- (b) Donor organism or organisms. Taxonomic status and common name, source, and the relevant biological characteristics of the donor organisms;
- (c) Vector. Characteristics of the vector, including its identity, if any, and its source or origin, and its host range;
- (d) Insert or inserts and/or characteristics of modification. Genetic characteristics of the inserted nucleic acid and the function it specifies, and/or characteristics of the modification introduced;
- (e) Living modified organism. Identity of the living modified organism, and the differences between the biological characteristics of the living modified organism and those of the recipient organism or parental organisms;
- (f) Detection and identification of the living modified organism. Suggested detection and identification methods and their specificity, sensitivity and reliability;
- (g) Information relating to the intended use. Information relating to the intended use of the living modified organism, including new or changed use compared to the recipient organism or parental organisms; and

(h) Receiving environment. Information on the location, geographical, climatic and ecological characteristics, including relevant information on biological diversity and centers of origin of the likely potential receiving environment.

**Annex II**  
**Rosters of National Scientists Involved in Biotechnology**  
**Research in Jordan**

<i>Sector</i>	<b>Researcher Name</b>	<i>Address</i>	<i>Degree and Rank</i>	
<b>1. Plant Tissue Culture</b>	Rida Shibli	Faculty of Agriculture/Jordan University of Science & Technology (JUST)	Ph. D	Professor
	Mohammad Swaan	Faculty of Agriculture/University of Jordan	=	=
	Moustafa Qronfeleh	Faculty of Agriculture/University of Jordan	=	=
	Jamaal Sawaan	Faculty of Agriculture/University of Jordan	=	=
	Sawsan Al oraan	Faculty of Science/University of Jordan	=	Ass. Professor
	Fawzih Al-Jarjafge	Hashemite University	Ph.D.	Ass. Professor
	Ibrahim Rawash	NCARTT	M.Sc.	
	Nedaal Al Daradkeh	NCARTT	B.Sc	
<b>2. Integrated Pest Man (IPM)</b>	Na'aem Sharaf	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Ibraheim Alnader	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Ahmad Almomani	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Thabet Alawi	Faculty of Agriculture/University of Jordan	Ph. D	Ass. Professor
	Hamed Khleif	Faculty of Agriculture/University of Jordan	Ph. D	Ass. Professor
	Marwan Abd	NCARTT	Ph. D	Researcher

	Wali			
	Faisal Namer	NCARTT	M. Sc.	Researcher
	Sameer Abd Jabar	NCARTT	M. Sc.	Researcher
	Mouna Trekhem	NCARTT	M. Sc.	Researcher

<i>Sector</i>	<b>Researcher Name</b>	<i>Institution</i>	<b>Degree and Rank</b>	
<b>3. Food Science and Technology, Yeasts and Enzymes</b>	Mohamad Al Yamani	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Malek Hadadin	Faculty of Agriculture/University of Jordan	Ph. D	Assistant. Professor
	Hala Alhorani	Faculty of Science/University of Jordan	Ph. D	Associate. Professor
	Khalil Ereifej	Faculty of Agriculture at JUST	Ph.D	Professor
	Hosain Mas'ood	Faculty of Science/University of Jordan	Ph. D	Assistant. Professor
	Amjad Mahasneh	Faculty of Science/JUST	Ph. D	Assistant. Professor
	Nezar Abu Harfeel	Faculty of Science/JUST	Ph. D	Professor
	Fo'ad Almomani	Faculty of Science/JUST	Ph. D	Assistant. Professor
<b>4. Genetic Engineering</b>	Mahmood Alqasrawi	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Wajih Oweis	Faculty of Science at JUST	Ph. D	Professor
	Monther Al Sader	University of Jordan	Ph. D	Assistant. Professor
	Omar Kafaween	Faculty of Agriculture/University of Jordan	Ph. D	Associate Professor
	Hanan Malkawi	Faculty of Science/ Yarmouk University	Ph. D	Associate Professor

	Mohamad AL Ajloni	Faculty of Agriculture/ JUST	Ph. D	Associate. Professor
	Sameer Masoud	Faculty of Agriculture/ Muo'ta University	Ph. D	Assistant. Professor
	Ismaeil Alsaadoun	Faculty of Science at JUST	Ph.D	Associate. Professor
	Isam Saleh	Albashir hospital	Ph.D	
	Ahmad Maslat	Faculty of Science Yarmouk University	PH.D	Associate Professor
	Ahmed Khalil	Faculty of Science Yarmouk University	Ph. D	Professor
	May Sadiq	Faculty of Science Yarmouk University	Ph. D	Associate Professor
	Salim Abderrahman	Faculty of Science and Art, Hashemite University	Ph. D	Associate Professor
	Salem Al-Maloul	Faculty of Science and Art, Hashemite University	Ph. D	Assistant Professor
	Khaled Tarawneh	Muo'ta University Faculty of Science	Ph. D	Professor
	Khaled Khleifat	Mu'ota University Faculty of Science	Ph. D	Assistant Professor
	Dhia Hassawi	Faculty of Science and Art, Al-Balqa University	Ph. D	Associate professor
	Maher Obeidat	Faculty of Science and Art, Al-Balqa University		Assistant instructor
	Adel Mahasneh	Faculty of Science University of Jordan	Ph. D	Professor
	Hussein Migdadi	NCART	Ph. D	
	Saeed Jaradat	Faculty of Science at JUST	Ph.D	Assistant Prof.
	Majid Fandi	NCART	Ph. D	
	Ibrahim Rawasdeh	NCART	M.Sc	Researcher
	Qasan Kana'an	Faculty of Agriculture/ Muo'ta University	Ph. D	Assistant. Professor
	Amjad Khalil	Faculty of Technological Agriculture/ Albalqa University	Ph. D	Assistant. Professor
	Raja Sa'ad Al	Faculty of Science/	Ph. D	Assistant.

	Deen	Muo'ta University		Professor
	Raja Sa'ad Al Deen	Faculty of Science/ Muo'ta University	Ph. D	Assistant. Professor
	Faisal Rjoob	Faculty of Agriculture/ Muo'ta University	Ph. D	Assistant. Professor
	Ehsan Mahasneh	Al Albayt University	Ph. D	Professor
	Khaled Abu- Elteen	Al Hashimeh University	Ph.D	Assistant Professor
	Ghandi Anfoka	Al –Balqa University	Ph.D	Assistant Professor
	Soheeh S'efan	NCART	M. Sc.	Researcher

<i>Sector</i>	<b>Researcher Name</b>	<i>Address</i>	<i>Rank</i>	
<b>5. Veterinary Medicine and Animal Production</b>	Mohamad Harb	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Shakeeb Abd Raheem	Faculty of Agriculture/University of Jordan	Ph. D	Professor
	Mohammad Al Tabbaa'	Faculty of Agriculture/University of Jordan	Ph. D	Assistant Professor
	Hosam Alteti	Faculty of Agriculture/University of Jordan	Ph. D	Assistant Professor
	Rami Kredly	Faculty of Agriculture JUST	Ph. D	Assistant Professor
	Shawkat Lafi	Faculty of Veterinary Medicine, JUST	Ph. D	Professor
	Nabil Hailat	Faculty of Veterinary Medicine, JUST	Ph. D	Professor
	Mustafa Aldomi	Faculty of Agriculture, JUST	Ph.D	Assistant Professor
	Falah Shidefat	Faculty of Veterinary Medicine	Ph.D	Associate Professor
	Mohammed Ababneh	Faculty of Veterinary Medicine, JUST	Ph. D	Assistant Professor
Mofeed Alnemer	Faculty of Agriculture/University of Jordan	Ph. D	Assistant Professor	

<i>Sector</i>	<b>Researcher Name</b>	<i>Address</i>	<i>Rank</i>	
<b>6. Biofertilizers and Agriculture Waste Product Recycling</b>	Mahmood Hamad	Faculty of Engineering/ University of Jordan	Ph. D	Assistant Professor
	Deef Alah Badarneh	Faculty of Agriculture/University of Jordan	Ph. D	Associate Professor
	Ali Alkarmi	Al Hashimeh University	Ph. D	Assistant Professor
	Basem Abasi	Al –Balqa University	Ph. D	Assistant Professor
	Mostafa Aljabar	Private Sector	Ph. D	
	Mona Hindia	Jordan Un.Sc.Technology	Ph.D	Ass.Prof>



## ANNEX 3

# 1. Study on the Existing Status of Biotechnology, Living Modified Organisms and Related Programs in Jordan

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d. Faculty of Allied Health Sciences/Laboratory Medical Sciences

##### 2. Yarmouk University/Department of Biological Sciences:

##### 3. Mu'tah University

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##### 4. Al- Balqa Applied University

-Faculty of Agriculture/ Department of Biotechnology:

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1. The Law of Agriculture ( Law No (40) 2002, Temporary):

2. The Law for the Protection of New Plant Species (Law No. 24, 2000):

3. Public Health Law ( Law No. (54) 2002, temporary):

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5. Law on Descriptions and Specifications (Law No.(15) 1994):

6. The by-law on the Health Quarantine in Aqaba Port ( NO.32, 1972 base on Aqaba Port Law No. 18,1959):

7. Decision No.4/5,1990 on Regulation Fisheries based on the Article 133, Law No.(20),1973:

8. Decision No.1 TH, 1996 on Prepared Feeds Concentrates Based on Article No.138, Law No.20, 1973.

9. The Jordanian Medical Council Law No. (12), 1982 and the By-law on th Higher Health Council No. (29), 1986 Based on the Public Health Law No (21), 1971.

10. Importation and Exportation Law No. (14), 1992.

11. Law for Industries and Crafts/Professionals No. 16, 1953.

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