



برنامج رعاية الجوائز والبحوث الصناعية اللبنانية  
Lebanese Industrial Research Achievements - program



Distr.  
LIMITED  
E/ESCWA/SDPD/2004/WG.1/16  
10 March 2004  
ORIGINAL: ENGLISH

---

## Economic and Social Commission for Western Asia

Forum on Capacity Building through Technology  
Transfer and Networking  
Beirut, 11-12 March 2004

# BIOTECHNOLOGY POLICIES, CAPACITY BUILDING, AND DEVELOPMENT STRATEGIES IN SELECTED ESCWA MEMBER COUNTRIES

## THE CASE OF LEBANON

By

Rabih Talhouk

---

Note: This document has been reproduced in the form in which it was received, without formal editing. The opinions expressed are those of the author and do not necessarily reflect the views of ESCWA.



## **Abstract**

The impact of biotechnology on world economy is becoming apparent and developing countries are realizing the need to build national competence in this field. Preliminary but intensive efforts from international agencies are well noted to ensure competence building in developing countries, technology transfer, in addition to aiding in strategy development. The fear that developing countries would serve only as markets for biotech products developed in industrialized countries can only be countered by plans for developing countries to adopt this technology with the intent of becoming contributors to this field. This entails that developing countries establish a research-based infrastructure, develop biotech-related policies, build national capacity and develop strategies to enable it to embrace biotechnology in the 21<sup>st</sup> century. This report describes plans that developing countries could undertake to design national biotech-related policies, and build national capacity in human and technical resources in addition to establishing the legal framework. The report addresses specifically the case of Lebanon and suggests a development strategy with case studies, one based on an ongoing local experience; the other discusses the successes and downfalls of the genetically modified Indian cotton. In brief, the report realizes that Lebanon is a country with unique characteristics in the Middle East that possess the capacity to develop biotechnology-based industry with long term planning and commitment from the government and private sector.



## **I. Introduction**

Whether a particular developing country successfully avails itself to the advantages of biotechnology will be determined by its capacity for development and the integration of modern technologies into its research and innovation systems. Compared to other Middle Eastern countries Lebanon is a country that prides itself with well-educated populace yet it has failed to develop so far its own research and development capacity in advanced technologies. At present, few marginal attempts have been initiated to develop and market biotechnology products but those have been dependent on personal initiative of few. Embracing biotechnology to enhance economic growth and alleviate poverty no doubt entails challenges, however, the justification of spending on biotechnology can also be disputed as to whether such an approach will help contribute to poverty alleviation, or will it only divert resources that could be better spent on conventional approaches?

Few developing countries (China, Brazil, Argentina, India) have been able to establish biotechnology-related industry and build national competence to any significant extent, yet not without problems. Nevertheless, biotechnology-related industries have provided means to the above developing countries to become producing partners in this newly established world wide market rather than simply consumers of a market strongly driven and dominated by developing countries and/or large conglomerate companies.

Confronted by such issues developing countries require policies, laws, and the capacity and competence to implement those policies and enforce needed laws the lack of which makes it difficult for governments to make decisions, and to absorb and utilize as well as manage and control the new biotechnologies. Smaller and poorer developing countries particularly in the Middle East are lagging behind in this aspect. Amongst the Middle Eastern countries, Lebanon perhaps holds a unique niche in that critical number of its young nationals have doctoral degrees in biotechnology or biotechnology related fields however few have returned to their country of origin, and although many yearn for a job “back-home” few have access to the limited job market and the poor prospects of further scientific development in Lebanon. Lebanon lacks the institutional base that is required to use the expertise effectively for the benefit of the country, nevertheless, a multifaceted effort involving different sectors in the society, to establish biotechnology-related industry in Lebanon may hold promise for developing new job markets for scientists, i.e. biotechnology producers, as well as end users of the technology such as farmers, and pharmaceutical and agriculture-related industries.

## **II. Building biotechnology relevant management and technical competence in developing countries**

As per the above, in Lebanon, as in the majority of developing countries, there is a lack of needed capacity to embrace biotechnology-related industry. In Lebanon it would seem that much of the institutional framework is already in place. There are universities and research institutes, biodiversity advisory bodies, there are policies addressing biodiversity being developed and environment protection authorities. Lebanon has also embarked on attending to biosafety issues and a national pool of expertise has been assembled to raise awareness and to address handling of biotech related products and GMO's. Nevertheless capacity and resources are inadequate relative to the needs that are created by modern biotechnologies. This makes it difficult for developing countries in general, and Lebanon in particular, a country still recovering from a 16 year civil war (1975-1991), to make policies, advice governments when decisions have to be made, and to make and enforce laws and regulations.

The gaps and needs vary from country to country, but include

- 1- short term needs of strengthening the capacity to manage current and pressing issues, and

- 2- longer term needs of establishing in-country capacity to educate needed expertise on the technical subjects and on the related legal, social and political issues.

## **1- Short term needs**

When developing countries such as Lebanon with potential capacity but not the actual capacity, are mandated to work with biotechnology issues, effective assistance can be provided through short-term projects in collaboration with "sister-institutions" in developed countries to establish the primary needs for a particular project at the technical level, policy and law, and biosafety level.

### **A• Technical issues**

When important needs in the country require the use of strategic technology elements, such as plant cell and tissue culture, and veterinary diagnostics and vaccine production, the necessary equipment and staff training can be provided through projects where responsible offices/institutes in Lebanon (for example Lebanese national Council for Scientific Research, Universities and Research Centers) are assisted by "sister institutions" in developed countries that have the necessary expertise and experience.

### **B• Policy and law**

Institutions that are responsible for management of genetic resources need to be guided by policies on biodiversity collection and international exchange. This includes capacity to negotiate terms, including sharing of benefits. In addition, capacity to negotiate and manage access to patented technology and to incorporate intellectual property rights issues into national policies is also needed. All of the above requires strengthening of professional capacities in various institutions. Sister institutions in developed countries and in-house consultants can attend to such issues.

### **C• Biosafety**

Responsible decision making on requests for importation of genetically modified (GM)-food, or the introduction of GM-technology, depends on professional assessment of biosafety issues according to the Cartagena Protocol. Lebanon, however, has not signed the Cartagena Protocol yet, and currently depends on existing regulations established by The Codex Alimentarius Commission created by FAO and WHO, in addition to guidelines established by the Lebanese Organization for Norms and Standards (LEBNOR) among others.

## **2- Long term needs**

Universities in Lebanon and the Arab countries do not have the capacity and resources to educate needed expertise in biotechnology and biotechnology related social sciences. This means lack of professionals for the growing needs in ministries and institutions, and lack of milieus for critical assessment and well-informed debates. These shortcomings imply that governments and private academic institutions must take the initiative and recognize the need to build an in-country capacity to educate and empower expertise and to undertake independent research on strategic technology and policy issues.

When such in-country capacity building is attained developing countries can then:

- A. assess technology needs and potentials
- B. use relevant technology elements in research and development
- C. formulate and enforce policies, laws and regulations
- D. negotiate contracts with industries and
- E. assume an effective participatory role in international collaboration on research, development and policy making.

### **III. International agreements**

Countries involved in setting up biotechnology-related industry or will be involved in import of genetically modified organisms (GMO)-related products have to conform to a set of international regulations and agreements that address the issues of biosafety and technology transfer along with other equally important concerns. Countries in question and international organizations such as FAO, WTO, United Nations and others institute these agreements. Lebanon has both signed and ratified some of these agreements such as the Convention on Biological Diversity (CBD), abides by others while another, such as the Cartagena Protocol, Lebanon is not a signatory yet.

#### **1- Convention on Biological Diversity**

The Convention obliges parties to conserve their biological diversity, to ensure utilization for sustainable development, and to share benefits arising from such utilization. Relevant technologies for such purposes, including biotechnology, should be made available for developing countries and be provided or facilitated on fair and favorable terms. Lebanon has signed the Convention on Biological Diversity in 1992, and ratified it in 1994 (Law No. 360/94). The section to follow was adapted from Berg *et al.* 2003 [Biotechnology in Developing Countries: Needs and Modes of Competence Building, Noragric Report, No. 14-A, April 2003].

#### **2- The Cartagena Protocol on Biosafety**

The Cartagena Protocol on Biosafety was adopted in January 2000 as an attachment to the Convention on Biological Diversity. The protocol deals with safe utilization and handling of biotechnology. It refers to the great potential of biotechnology and recognizes the “crucial importance to humankind of centers of origin and centers of genetic diversity”. Lebanon has not yet signed the Cartagena Protocol on Biosafety.

#### **3- FAO: Code of Conduct on biotechnology**

The FAO Commission on Genetic Resources for Food and Agriculture is developing a Code of Conduct on Biotechnology (Commission on Genetic Resources for Food and Agriculture; Ninth Regular Session, Rome, 14 – 18 October 2002) aimed at maximizing the benefits of modern biotechnologies and minimizing the risks. While this started with plant biotechnology only, the scope is about to be widened to cover all components of genetic resources including plants, livestock, fish and micro-organisms as they relate to food and agriculture<sup>8</sup>. Also this instrument is likely to emphasize “capacity building for all aspects of biotechnology including biosafety, bio-trade and bio-policy” with particular reference to needs in developing countries.

#### **4- World Food Summit**

The World Food Summit (1996) agreed on an objective to “reduce by half the number of chronically undernourished people on the Earth by the year 2015”. The new summit “Five years later” (June 2002) reaffirmed earlier commitments to end hunger and passed a Declaration that has a reference to needs of research applying new technologies, including biotechnology.

#### **5- Other international relevant agreements**

Lebanon follows the regulations of the Sanitary and Phytosanitary Agreement and has a Department of Phytosanitary control to meet the requirements of importing countries. Also, Lebanon is a potential member of the EU-Mediterranean Plant Protection Organization (EPPO).

#### **IV. Policy making**

It is crucial for the developing world to acquire skills for handling and developing technologies aimed at answering its growing needs in harvesting the available resources and widening the job market for both scientists (as producers of biotechnology) and potential end users. However, the risks entailed in implementing biotechnology in the developing countries are immense especially if lacking guidelines and regulations for inspection and examination.

It is necessary for developing countries to set up a series of rules and policies to guide the development and usage of biotechnology among all the concerned parties. Such policies would address the roles of the scientist, end user, government, non-governmental agencies and funding agencies. It would also be of equal importance to address the issues of property transfer, patent laws, institutional property rights and awareness among the public and the concerned officials

The design of policies requires a multi-disciplinary work effort where scientists, end-users, consumers, lawyers and proper officials from governmental and other involved institutions participate to set up the proper legal framework for the whole chain of biotechnology production and usage.

Hence, the design of the proper national policies is addressed and serves as the backbone to guide the future implementation of such policies.

##### **The design of national policies:**

The first challenge in setting up policies is the process of seriously evaluating and understanding the potential use, benefits and risks involved in biotechnology implementation, and in identifying the main points for designing rules and regulations. The country's resources and the potential work fields should be assessed, and appropriate policies should be formulated to answer the specific demands of that particular country. This is especially true concerning the issues of available material and expertise, and the possible need of relying on foreign skill and help. Proper policies should be designed to:

- 1- assign priorities in the work effort and to ensure sustainability
- 2- allocate roles for the private and public sectors and to ensure proper interactions
- 3- protect institutional property rights and to guide technology transfer
- 4- guide research for the poor
  - A. Allocation of additional public resources to agricultural research
  - B. Conversion of some social benefits to private benefits
  - C. Protect intellectual property rights
- 5- increase public awareness
- 6- ensure the application of safety measures
  - A. health risks
  - B. ecological risks
- 7- strengthen policy makers and scientists' capacities

##### **Current status of legal and policy frameworks in Lebanon**

As stated earlier, Lebanon has participated in 7 working group meetings and negotiations of Cartagena Protocol on Biosafety and has contributed actively for the adoption of the Protocol. However, and despite the fact that the ratification process is in progress Lebanon is not a signatory to the Protocol yet. Lebanon follows the regulations of the Sanitary and Phytosanitary Agreement and has a Department of Phytosanitary control to meet the requirements of importing countries. Lebanon is also in the process of acceding the World Trade Organization (WTO), and is a potential member of the EU-Mediterranean Plant Protection Organization (EPPO). During the last decade, only two scientific meetings on biotechnology were held in Beirut Lebanon. One was on biotechnology and technology transfer, and the other entitled "Towards



a New Millennium of Agricultural Innovations” (2000). Both meetings were of great relevance to the region and provided insight not only to the available technologies, but technologies most appropriate to the countries of the region. Unfortunately, most of universities and research centers in Lebanon, do not address legal or policy issues relevant to biotechnology, instead studies address agriculture-related or biomedical-related genetic engineering at broad academic level and narrow practical level, especially, in tissue-culture techniques to improve plant propagation and multiplication of major horticultural crops and fruit trees, as a tool to facilitate conventional methods of disease-free plant breeding, and for detection or clinical diagnosis of infectious or genetically transmitted diseases.

#### *i- Lebanese relevant regulations*

Lebanese regulations, as in most other developing countries, do not include guidelines for handling transgenic materials under contained conditions, nor do they cover the release of GMOs (genetically modified organisms) into the environment. In addition, there is no evidence of any introduction of GMOs among the imported food commodities, except for oils of corn, sunflower, soybean, and peanut, according to the office of consumer protection at the ministry of economy and trade (Jan 2004). Recently, Lebanon issued a legislation concerning GMO's, addressing the use of frozen kernels. It states among other matters that labeling of GM foods is mandatory. In fact, any GM food should carry the “genetically modified” label (Lebanon organization for norms and standards [LEBNOR], 705:2003). In addition, the Ministry of Economy and Trade has presented to the Lebanese government a food safety law (2003) to be approved prior to its adoption by the Lebanese parliament. There are, also, laws aimed at the protection and improvement of the environment and its local genetic heritage; and the control of importation, manufacturing and use of pesticides, herbicides and insecticides. At the same time, there are drafted laws that involve Environmental Impact Assessment and introduction of alien species issues.

A broad segment of relevant actors and decision makers are not yet fully aware of the necessity to develop adapted policies and procedures to govern the use of biotechnology in the country. However, the ministry of agriculture has issued a letter of intent in 2003, directed to ESCWA expressing the need to develop such policy approaches. Biotechnology could provide a broad potential for the development of the economic sectors in Lebanon, and providing a regulatory framework for biotechnology activities is vital at that time.

#### *ii- National Policy on Biosafety*

Lebanon also needs to develop a national biosafety framework that would fuel its entry into the 21st century, and solve practical agricultural and health problems, as well as the existing and foreseeable obstacles to such an endeavor.

Lebanon will start soon the development of its National Biosafety Framework through the UNEP/GEF project that will assist Lebanon in developing the necessary regulatory regime for biosafety. In fact, the Initiative for Biodiversity Studies in Arid Regions (IBSAR) at the American University of Beirut (AUB) has recently been assigned as the contracted party to develop the regulatory framework on biosafety in Lebanon.

In addition Lebanon has assigned a six member Roster of experts on biosafety in accordance with convention on biological diversity.

### **V. Capacity building**

Developing countries need to build their own capacity in locally appropriate ways. This is of great concern for developing countries as they are being used as a market for dispensing industrialized countries' biotechnology products, at the expense of developing their own economy and exploiting their own resources and manpower. However, to be independent of export and external intervention developing countries must shape their capacity for handling biotechnology. In the process of capacity building, developing countries must consider:

**Relevance of development issues.** Addressing fundamental development concerns, including poverty alleviation for rural and urban populations and sustainable management of natural resources.

**'Integrated value chain'.** The concept is best understood as a chain of events that starts with the definition of a problem and ends with sustained market penetration of a new product, process, or service. This approach builds on already existing capacities and thus increases the chances for end-users to benefit from the new technology.

**'Transsectoral' topics.** Topics such as technology assessment and transfer, biosafety, ethics of biotechnology, and intellectual property management are to be given due importance in an area that is as innovative as it is controversial.

Biotechnology development and capacity building requires a variety of different inputs such as human resources, biological and technical capacities. Therefore, without the background of a multidisciplinary team and an adequate infrastructure, successful results can hardly be achieved. Moreover, technology routes cannot be exploited without proper linkages to producers and an established legal framework.

### **1- Capacity building of human resources:**

In this approach several goals must be met that would ensure:

- A. participation of institutional structures
- B. a closer relationship between the public and private sectors through enhanced access to information and knowledge by effective interaction between scientists, end users and policy makers
- C. acquisition, development and diffusion of biotechnology via formation of multi-disciplinary teams with natural scientists, extension workers, administrators and non-governmental organizations (NGO).

### **2- Capacity building in technical resources and development of procedures, management, organizational structure, or strategy formulation**

In this approach several goals must be met that would ensure

- A- establishing the fields of priority
- B- identification of specific projects for funding via a process that would involve the participation of different stakeholders, including end users.
- C- involvement of experts in evaluation of the proposed projects including a social scientist familiar with participatory approaches.
- D- technology assessment and prioritization of technological requirements by end users.

### **3- Capacity building in policymaking, biosafety, patent law and intellectual property rights.**

In this approach the objective is to strengthen the capacities of policymakers and to increase awareness among potential users and producers of biotechnology about policy related issues, biosafety, and patent rights in order to establish the correct framework. Capacity building should lead to

- A- development of legal and policy frameworks

- B- establishing the needed framework for high-level safety laboratory procedures and guidance in biosafety issues
- C- safeguarding intellectual property rights and technology transfer.

## **VI. Development strategy**

The development of an implementation strategy, that take into account the situation of the particular country, comes as the last but most crucial step to put into operation the application of biotechnology based projects.

The first step for implementing development strategies is to outline the contents of research needed in response to the promises and threats by current and expected future developments in biotechnology and genetic engineering. This can not be done before evaluating the country's particular circumstances and the extent to which biotechnology can serve its development.

The outline for a development strategy should take into account all the relevant issues specific to the country in question. These should include, but need not be limited to the availability of bio-resources, the availability of human resources to exploit the opportunities in biotechnology, the extent of industrial activity which could help biotechnology, and opportunities presented for biotechnology application in several domains.

The actions that need to be undertaken in setting up a strategy for development of biotechnology-related industry are:

- 1- Restructuring to ensure the optimal collaboration between the producers of biotechnology whether in Universities or industry and the end users.
- 2- Improvement of innovation capacity by encouraging research and development collaborations between national and/or foreign universities, research centers, and industries
- 3- Consolidation of local innovation systems: 'science parks' can be created to stimulate technology transfer between the public and the private sector. In these locations, research capacity, training, education and biotechnology industry are concentrated.
- 4- National biotechnology programs: National strategic programs and initiatives involving industrial parties can be established with the aim to create biotechnological enterprise zones or bio-valleys similar to Silicon Valley in Northern California, USA, or Andhra Pradesh in Southern India.
- 5- Intervention of governmental and non-governmental agencies. The roles of the private and public sectors in these programs should also be governed by strategies to maximize the benefits from the effort.

Lebanon is a small developing country with limited natural resources, especially when compared to other developing countries that have been successful in launching a biotechnology-related industry such as China, Brazil and India. From that perspective and when considering strategies for development of biotechnology industries, it is crucial to consider the unique situation of Lebanon in the region, in terms of its "long tradition of espousing liberal market economics with free investment policies, unrestricted capital mobility, complete foreign exchange convertibility and extensive links with developed world" in addition to its political system, and the notable level of education among the populace.

Industrial activity so far in the area of biotechnology is virtually non-existent and minor efforts largely in first generation biotechnology like preparation of vaccines for animal health (LNCSR funded projects in 1980's), and establishing tissue culture units to produce ornamental plants and strawberries (private initiative in the 1990's) have been attempted. Whereas these efforts have been largely thwarted because of the prevailing conditions in Lebanon in the 1980's during the civil war era and the 1990's post the civil war era, the need to create a critical mass of industrial *activity* in biotechnology involving recombinant DNA- based products is no doubt needed and essential.

Today and in line with the developed world, setting up a strategy for biotechnology development in Lebanon requires a clear directive from the government to found biotechnology as a strategic sector of economy. The networks connecting scientists, end users, entrepreneurs and financial markets need to be established. Incentives must be provided to scientists in elite centers of academic excellence to spearhead such efforts, to create firms and to form strategic research and development alliances.

With the above noted and in addition to Lebanon's uniqueness and its commitment to academic excellence, two approaches can be considered for setting up a development strategy suitable for the country's needs. The first 'academic based approach' relies on academic institutions for implementing biotechnology based research and industry, and the second follows the Interactive Bottom Up (IBU) approach adopted by other countries. Both approaches are discussed in detail.

***National Biotechnology Steering Committee:*** For Lebanon to consider undertaking either of the above approaches (i.e. academic based approach or IBU) for strategy development a National Biotechnology Steering Committee must be established. The National Biotechnology Steering Committee will act as an advisory body. The members of the Committee will be leaders and experts from academia and industry, both local and international, in the field of biotechnology. The committee's mission will be to oversee the development of national policy issues related to biotechnology, to support scientific ventures that will lead to economic growth and have applied aspects, to foster business activities and investments in the biotechnology industry, to ensure continuity of interaction, during the critical stage, between academic research and business activity. To seek funds for establishing national biotechnology infrastructure and to facilitate international collaboration.

## **VII. Addendum**

The report will include appendices listing examples of currently funded biotechnology related research in Lebanon. In addition, a case for India's pest resistant genetically modified cotton is discussed and a case study for a multidisciplinary research group (IBSAR) established at AUB is also presented. IBSAR is using biotechnology tools to assess medicinal value of indigenous Lebanese plants typically used in folk medicine as a means to validate their use either as herbal medicine and/or for drug discovery programs. Parallel efforts in tissue culture techniques and plant propagation accompany these studies to ensure production and collection of promising plants without infringing on their natural habitats and to provide farmers with alternative cropping options with potentially competitive markets. Workshops for patent right, intellectual property and material transfer are also an integral part of this project. Finally an appendix is also included that describes the current core molecular biology laboratories at AUB.

## **VIII. Conclusion**

The report stresses the fact that Lebanon is a country that lacks the actual capacity but has the potential capacity and with proper interdisciplinary and multifaceted approach involving the scientists as producers of biotechnology, policy makers, end users and government among others, Lebanon can become a producer and user of biotechnology products. This will create new job opportunities for scientists, end users as farmers, and related industries whether pharmaceutical or agricultural.

## **Acknowledgement**

The author acknowledges with gratitude the major contribution and diligent work of Ms. Rana Mroue towards the preparation of this document. Thanks as are also extended to Dr. Medhat Khattar for critical reading of the document. The help and material provided by the Lebanese National Science Research Council, Mr. Foad Fleifel (Ministry of Economy), Ms. Wafa Hamzeh (Ministry of Agriculture), Dr. Fadia Homeidan (Director, Office of Grants and Contracts, AUB) and Dr. Salma Talhouk (Director of IBSAR, Faculty of Agriculture and Food Science, AUB) is highly appreciated.

*References used in the preparation of this “summary” document and the “full-text” document are only included in the latter.*

Biotechnology Policies, Capacity Building, &  
Development Strategies in ESCWA Member  
Countries

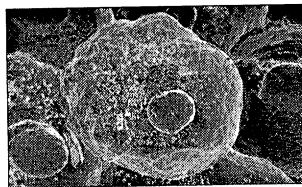
*Biotechnology industry in Lebanon:  
is it a viable option?*

**Rabih Talhouk, PhD**

Biology Department  
American University of Beirut, Lebanon

Why is biotechnology receiving  
much attention?

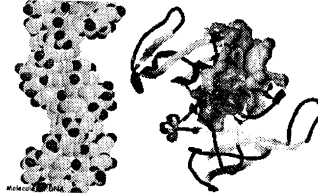
After the 1960s and '70s the development of  
biological techniques made a wide range of  
biological processes available for research +  
industrial uses



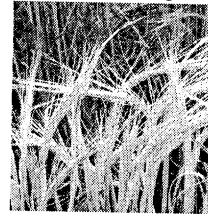
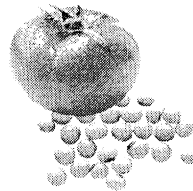
→ Tools available at the cellular and molecular levels

# Biotechnology

Used in basic research



and is also a major component of industry



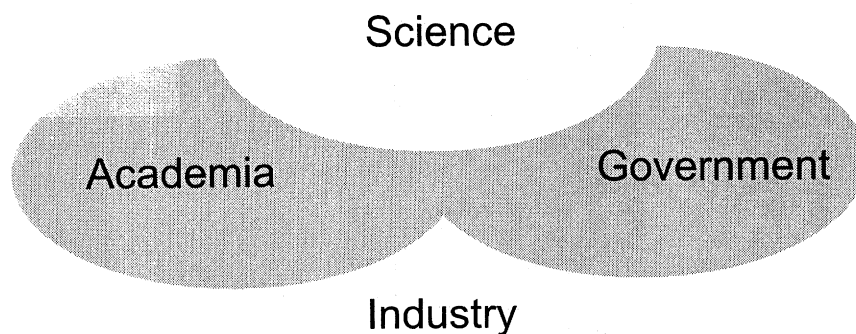
- > 325 million people worldwide helped by > **155 biotechnology drugs and vaccines**: targeting > 200 diseases
- Consumers already enjoying **biotechnology foods**: papaya, soybeans and corn.
- **100's biopesticides and other agricultural products**
- **Environmental biotechnology products** to clean up hazardous waste.
- **Industrial biotechnology applications**
- **DNA fingerprinting**: improved criminal investigation/ forensic medicine + significant advances in anthropology/ wildlife management

....However

Only **Developed countries** benefit from the many offers of biotech...

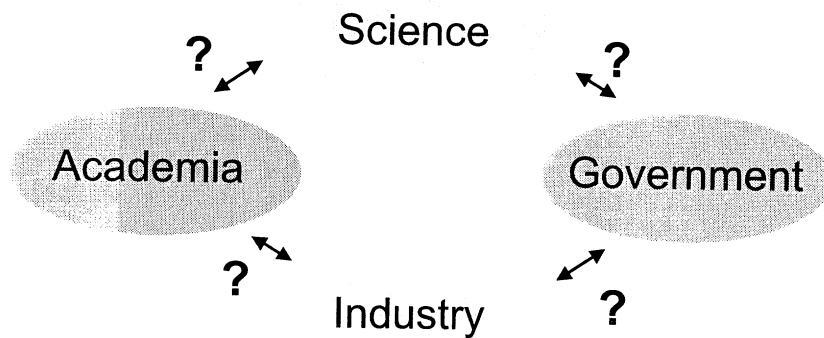
**Developing world countries** have not been successful at implementing biotech as part of their industry for a number of reasons...

In developed countries:





In developing countries:



Need to develop Biotechnology industry:

▪ For:

- socioeconomic growth
- wider job markets
- Enhanced productivity

Become independent of biotech imports

By:

Developing local technology based industries + educational / research infrastructure

## What needs to be done:

- Designing national policies to regulate the sectors involved in biotechnology
- Building capacity among the population in issues relevant to biotechnology
- Developing an appropriate strategy for implementing a biotech industry

## What is required:

- **a concerted effort amongst various sectors:**
  - government
  - academic and research centers
  - Industry
- **thorough planning at various levels:**
  - assessment of needs
  - evaluation of resources available
  - set up of a proper development strategy

# Design of national policies

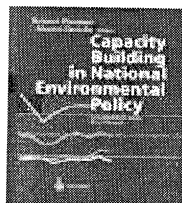
- **Policies are needed to:**

- assign priorities in work & ensure sustainability
- target the private & public sectors
- protect institutional property rights & technology transfer
- guide research for the poor
- increase public awareness
- ensure safety measures application
- strengthen policy makers and scientists



# Capacity building

- Capacity building for human resources
- Capacity building in technical resources & development of procedures, management, strategy formulation
- Capacity building in policy making, biosafety, patent law and IPR



## **Development strategy**

- Depends on a country's particular situation: resources/ capacity/ industry
- Should involve a clear directive from the government
- Aims at founding biotech as a strategic sector of economy
- Two approaches preferred: (FOR LEBANON)  
Interactive Bottom Up approach-IBU  
Academic-based approach (IBSAR)

## **IBU approach**

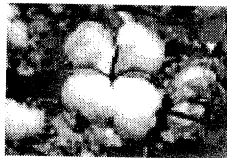
- Emphasizes research adapted to end users needs
- Ensures continuous interaction among end-users
- Ensures participation of even small scale end users
- Mostly helpful in agricultural biotech

## Academic-based approach:

- Task for biotech implementation initially in the care of academic institutions
  - micro-biotech industries: spin-offs from research based findings
  - Scientists can envision a commercial value for their findings
- A need for proper government legislation/ coordination with research centers/ IPR laws

## Indian biotech relevant to economy: GM cotton

- Cotton: an essential crop in India
- Targeted by an aggressive pest
- Cost of pesticide very high for farmers
- Losses among farmers + ↘ productivity



Need for a solution!

## Biotech-based solution:

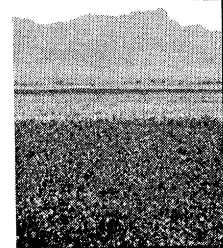
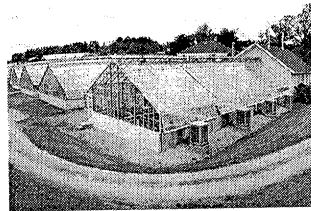
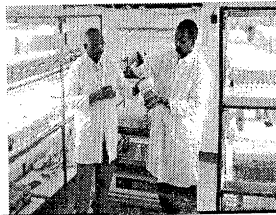
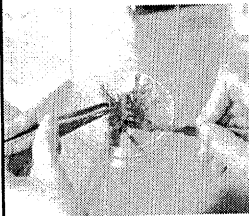
- Develop a genetically modified pest resistant crop



## The Indian Government & Mahyco

1996 : Import Seeds

2002 : Three Bt hybrids released by GEAC for commercialization.



## Success or Failure?

- Controversial safety claims
- Differing data concerning amount of yield increase

*However...*

- There was an increase in yield + resistance to pest reduced cost of pesticides used

## Lebanon Status

- Points of strength:
  - Well educated populace
  - Favorable economic and political system
  - Many educated nationals abroad yearning for a job back home

*+ Lebanon has participated in conventions on biotech/  
biodiversity/biosafety*

## Lebanon status

- Lacks the appropriate framework



- Research carried out mainly at Private academic institutes



One research project of relevance to industry and of potential economic value is:

### **IBSAR**

**The Initiative for Biodiversity Studies in Arid Regions:**

“Conduct policy implementable and economically feasible activities addressing national priorities”



## IBSAR

**studying the value of indigenous ornamental and folk medicinal plants, relying primarily on biotechnology and multidisciplinary approaches, with the hope to provide end users (farmers) alternative marketable crops to traditional ones with lower market value.**

## IBSAR

- Establish and strengthen scientific links through specific ongoing research activities
- Develop technology transfer skills
- Develop and strengthen links with private sector
- Develop biodiversity related legislation
- Training and capacity building

... however, much more needs  
to be done

- IBSAR a self contained work effort which could serve as a model for wider reaching projects
- These will need:
  - Government participation
  - Expanding research to public sectors

....

## Conclusion.....

- 1. Lebanon is a country that lacks the actual capacity but has the potential capacity**
- 2- Lebanon can become a producer and user of biotechnology products.**

**IF ...**

**A multifaceted approach is adopted involving scientists as producers of biotechnology, policy makers, end-users, NGO's and government.**

## Acknowledgments

**ESCWA**

**Dr. Omar Bizri, ESCWA**

**Ms. Rana Mroue, AUB**

