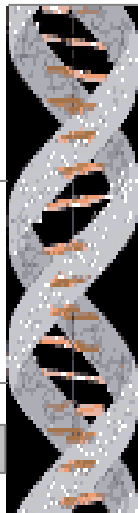
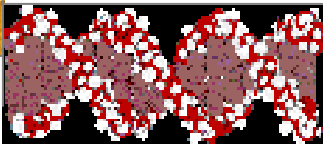
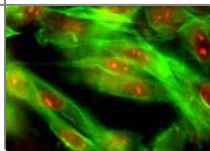




Biosafety & Genetically Modified Organisms



What is Biosafety?

“Biosafety” means the mechanism developed through policy and procedures to ensure the environmentally safe application of biotechnology which results to develop Genetically Modified Organisms (GMOs).

What is Genetic Modification?

Genetic modification is a technology which allows scientists to take genes from one organism and put them into another. This changes the way the organism develops, making new types of plants and animals.

What is Gene?

All organisms, from viruses to humans, contain a unique set of instructions which set down how they develop, grow and live called genome. These instructions are found inside cells on a long molecule called DNA. DNA is divided into small section which control different aspects of the organism’s growth and characteristic, and these sections are called genes. Very simple organisms such as bacteria may have a few thousands genes, while more complicated organisms have many more, for example, it has been estimated that maize has around 50,000 genes.



What are Genetically Modified Organisms (GMOs)?

A Genetically Modified Organism (GMO) is an organism whose genetic material has been altered using recombinant DNA technology. Recombinant DNA technology is the ability to combine DNA molecules from different sources into the one molecule in a test tube. Thus, the abilities or the phenotype of the organism, or the protein it produces, can be modified through the modification of its genes. In genetic engineering, DNA is cut up and genes can be moved around from one organism to another.

GM products (current or in the pipeline) include medicines and vaccines, foods and food ingredients, feeds and fibers.

What types of GM products: Benefits and Controversies

Benefits

- **Animals**
 - Increased resistance, productivity and feed efficiency
 - Better yields of meat, eggs, and milk
 - Improved animal health and diagnostic methods

- **Crops**

- Improved resistance to disease, pests, and herbicides
- Increased nutrients, yields, and stress tolerance
- Reduced maturation time
- Enhanced taste and quality
- New products and growing techniques

- **Environment**

- "Friendly" bioherbicides and bioinsecticides
- Conservation of soil, water, and energy
- Bioprocessing for forestry products
- Better natural waste management
- More efficient processing

- **Society**

- Increased food security for growing populations

Controversies

- **Access and Intellectual Property**

- Domination of world food production by a few companies
- Increasing dependence on industrialized nations by developing countries
- Bio-piracy foreign exploitation of natural resources

- **Ethics**
 - Violation of natural organisms' intrinsic values
 - Tampering with nature by mixing genes among species
 - Objections to consuming animal genes in plants and vice versa
 - Stress for animal
- **Labeling**
 - Not mandatory in some countries (e.g., United States)
 - Mixing GM crops with non-GM confound labeling attempts
- **Safety**
 - Potential human health impact: allergens, transfer of antibiotic resistance markers, unknown effects, potential environmental impact: unintended transfer of transgenes through cross-pollination, unknown effects on other organisms (e.g., soil microbes), and loss of flora and fauna biodiversity
- **Society**
 - New advances may be skewed to interests of rich countries

Convention on Biological Diversity (CBD) and Cartagena Protocol on Biosafety

The Convention on Biological Diversity (CBD) is an international treaty that was adopted at the Earth

Summit in Rio de Janeiro in 1992. The Convention has three main goals.

- 1- Conservation of biological diversity
- 2- Sustainable use of its compounds and
- 3- Fair and equitable sharing of benefits from genetic resources.

It was open for signature on 5th June 1992 and entered into Force on 29th December 1993.

Pakistan signed the Convention on 5th June 1992 and became the party to the Convention on 26th July 1994 by ratification.

The convention recognized for the first time in international law that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use. It also covers the rapidly expanding field of biotechnology through its Cartagena Protocol on Biosafety, addressing technology development and transfer, benefit-sharing and biosafety issues. Importantly, the Convention is legally binding; countries that join it ('Parties') are obliged to implement its provisions.

With a view to adopt sufficient precautions on transboundary movement of LMOs, a Cartagena Protocol on Biosafety to the Convention on Biodiversity was adopted on 29 January 2000 and it came into force on 11 September 2003. The Protocol deals with safe transfer, handling and use of LMOs such as genetically engineered plants, animals, and microbes that can cross international borders. The Cartagena Protocol is also intended to avoid adverse effects on the conservation and sustainable use of biodiversity without unnecessarily disrupting world food trade. Till October 2, 2006, 134 instruments of ratification or accession to Cartagena Protocol were deposited with the UN including countries of our region like Iran, India and Bangla Desh.

Pakistan is Signatory to this Protocol on 4th June 2001. The summary for the Ratification to Cartagena Protocol on Biosafety to the Convention on Biodiversity is under way to be submitted to the Cabinet Division.

GMOs Fate in Pakistan and Role of the Ministry of Environment

To get the full benefit of this advanced technology and for the safety of human and environment, Pakistan Biosafety Rules have been notified on 21st April, 2005, S.R.O. 336 (I)/2005, governing the manufacture, import, and storage of modified organisms and gene technological products for

research, whether conducted in laboratories of teaching, research and development institute in public and private sector. The work involved the field trial and commercial release of developed GMOs (plants, animals and microorganisms). The import, export, sale and purchase of GMOs for commercial purposes.

After notification of Biosafety Rules 2005, the National Biosafety Guidelines, 2005 were developed, which establishes the proper procedures and forms to carry out the above mentioned activities related to GMOs under the safety limits. The Pakistan Biosafety Rules 2005 provides legal cover to the National Biosafety Guidelines and its implementation in the country.

The mechanism of monitoring and implementation of the National Biosafety Guidelines is built on the following three tiers as specified in the Biosafety Rules, 2005.

- i) National Biosafety Committee (NBC)
- ii) Technical Advisory Committee (TAC)
- iii) Institutional Biosafety Committee (IBC)

NBC is headed by Secretary Ministry of Environment, is responsible to oversee all laboratory work, field trial, commercial release, import, export, sale and purchase of GMOs and their products. All applications/requests of any such

activity related to GMOs, as prescribed in the National Biosafety Guidelines 2005, will be submitted to the relevant IBC which is monitoring, implementing and regulatory authority at baseline level. Then these must be transferred to TAC for assessment and on its recommendations, NBC will take further necessary actions.

Implementation of Project “National Biosafety Centre”:

National Biosafety Centre, which serves as the secretariat of the National Biosafety Committee. The National Biosafety Centre provides the requisite set-up for the implementation of the Biosafety Rules, 2005 and Biosafety Guidelines, 2005. The over all objective of the centre is to provide safeguard against undesirable effects of the Genetically Modified Organisms (GMOs).

For awareness raising about the GMOs and the risk involved for human health and environment, public notices, workshops and seminars may be arranged country wide on federal as well as provincial levels.

Composition of National Biosafety Committee

Secretary	Ministry of Environment	<u>Chairperson</u>
Director General	Pakistan Environmental Protection Agency	<u>Member/Secretary</u>
Director General	Environmental Protection Agency Sindh, Karachi	Member
Chairman	Pakistan Agriculture Research Council	Member
Secretary	Sports and Environment, Government of Balochistan.	Member
Chief Health	Ministry of Health	Member
Director General, National Institute of Science & Technical Education (NISTE)	Ministry of Education	Member
Member (Sciences)	Pakistan Atomic Energy Commission	Member
Director General	Environmental Protection Agency, Government of AJK	Member
Director General	Pakistan Environmental Protection Agency, Government of N.W.F.P	Member
Director General	Federal Seed Certification and Registration Department (Ministry of Food and Agriculture)	Member
Director General	Department of Plant Protection	Member
Assistant/Deputy Scientific Advisor	Ministry of Science and Technology	Member
District Officer	Environment Rawalpindi Government of Punjab	Member

Composition of Technical Advisory Committee

Director General	Pakistan Environmental Protection Agency	<u>Chairperson</u>
Director	National Institute of Bio Technology and Genetic Engineering, Faisalabad.	<u>Vice Chairperson</u>
Director	Pakistan Environmental Protection Agency	<u>Member/ Secretary</u>
Executive Director	Pakistan Medical Research Council (PMRC), Islamabad	Member
Director (Training/Analytical Laboratory)	Pakistan Council of Industrial and Scientific Research (PCSIR), Islamabad	Member
Director	Health Services Academy (HAS), Islamabad	Member
Executive Director	National Institute of Health, Islamabad	Member
Deputy Chief Scientists/Cotton Breeder, NIAB	Pakistan Atomic Energy Commission, Islamabad	Member
Director	Centre for Molecular Genetics, University of Karachi	Member
Professor of Molecular Biology	Centre for Applied and Molecular Biology, Lahore	Member
Secretary General NCB/Member Food and Agriculture	National Commission on Biotechnology, Islamabad	Member
Member	Plant Sciences, Pakistan Agriculture Research Council (PARC), Islamabad	Member
Member	Animal Sciences, Pakistan Agriculture Research Council (PARC), Islamabad	Member
Two experts	From Private/Civil Society	Member



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