

THE GENOME

NEWSLETTER

Biosafety and GMOs in synergy: A novel era in Pakistan

And it is He who sends down rain from the sky, and We produce thereby the growth of all things. We produce from it greenery from which We produce grains arranged in layers.

- Surah Al-An'am Ayat 99 (6:99 Quran)

Advancement in Biotechnology

Manipulation of living organisms to create new products has dated back to earlier civilizations. The development of biotechnology can be divided into three different categories: Ancient Biotechnology, Classical Biotechnology and Modern Biotechnology. The developments in the ancient period/pre-1800 are termed as Ancient Biotechnology. For instance, Egyptian used yeasts to bake breads, Chinese developed techniques for brewing and making cheese. However, the Classical Biotechnology emerged around nineteenth century when **Gregor Mendel** submitted his work on genetics. Then, in 1919, **Karl Erkey** a Hungarian Engineer first coined

the term Biotechnology. During this time, **Alexander Fleming** discovered antibiotic *Penicillium* in 1928. Next, the Modern Biotechnology emerged after the Second World War. The first invention that is often credited as the landmark in modern biotechnology is the development of recombinant DNA technology. It was pioneered by **Stanley Cohen** and **Herbert Boyer** in 1973. Today, genetic engineering techniques are involved in development of improved crop varieties, vaccines, and bioremediation, medical, pharmaceutical, agricultural, and environmental sectors. Various transgenic crops with improved nutritional quality enhanced insect resistance, and abiotic stress resistance have been developed using biotechnological techniques.

Biosafety Clearing House

For the concerns over usage of biotechnological products, wellbeing of the health and environment, Biosafety Clearing House (BCH) emerges as a critical cornerstone of global biosafety governance in the world. By facilitating the exchange of information, fostering transparency, and supporting capacity building efforts, BCH empowers nations to make informed decisions regarding the safe handling, transfer, and use of genetically modified organisms (GMOs). BCH is an international mechanism set by Cartagena Protocol on Biosafety to facilitate the exchange of information about the transport and handling of Living Modified Organisms (LMOs).



Website: <https://environment.gov.pk/>

LinkedIn: <https://www.linkedin.com/in/pakistan-biosafety-clearing-house-5b40782bb>

X: <https://x.com/PakEPAlslamabad?t=QwHszcH1QsMQxDnk7IGW4g&s=09>

Era of Agricultural Biotechnology in Pakistan

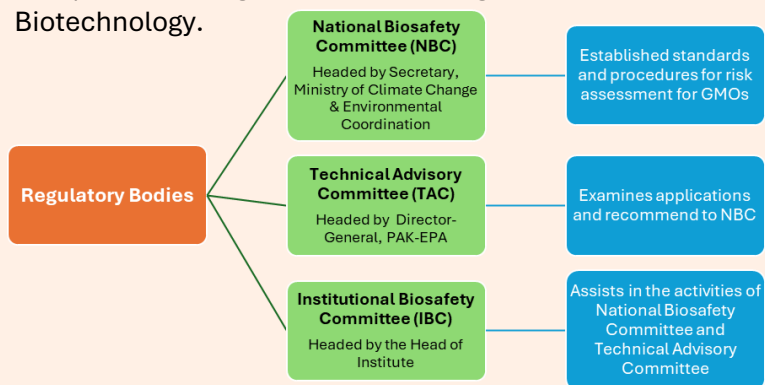
Biotechnology has a great potential for promoting crop improvement, enhancing food security, and reducing poverty in Pakistan. Pakistan is one of emerging country in the field of Biotechnology and Genetic Engineering. The earliest milestone in biotechnology research in Pakistan was the establishment of National Institute for Biotechnology and Genetic Engineering (NIBGE) in Faisalabad in 1987. It developed the first transgenic crop, “Bt Cotton” in 2007. Bt gene from a soil-borne bacterium *Bacillus thuringiensis* was introduced in cotton that regulates the insect resistance in modern cotton cultivars. In Pakistan, most of the crop improvement activities using modern biotechnology are focused on cotton which is one of the top five crops of Pakistan. More than 90% of cultivated cotton is transgenic in nature. Other than this, Brassica, chickpea, chilies, potato, sugarcane, tobacco, tomato, and now soyabean has taken up.



Cotton Varieties in Punjab, Pakistan	Number of recommended varieties	Source
Bt Cotton (single gene)	45	www.dai.agripunjab.gov.pk
Bt Cotton (Triple gene)	07	www.dai.agripunjab.gov.pk

Pakistan Environmental Protection Agency (PAK-EPA)

Pakistan Environmental Protection Agency (PAK-EPA) has put its efforts for protection, conservation and rehabilitation of environment by enforcing laws according to Pakistan Environmental Protection (PEPA) Act 1997. Functions of PAK-EPA includes approving Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE), issuing certificates for environment labs in the Islamabad Capital Territory, establishing and monitoring the National Environmental Quality Standards (NEQS), and specifying safeguards for prevention of accidents and disasters. Further, it has established Pakistan Biosafety Clearing House (Pak-BCH) for ensuring the safe handling and commercialization of GMOs and overseeing the research work on Biotechnology.



International Commitments of Pakistan	Date of Signing the Protocol	Date of Ratifying the Protocol
Convention on Biological Diversity (CBD)	June 18, 1992	October 24, 1994
Cartagena Protocol on Biosafety	June 4, 2001	May 31, 2009



Meeting with Centre of Excellence for Molecular Biotechnology. CEMB is a flagship research and training institute in the field of molecular biology in Pakistan. It houses state-of-the-art molecular biology facilities, enabling its research community to tackle fundamental problems in biology at the molecular level and to translate the research outcomes for the benefit of the society.

Official Visit (8th March - 11th March, 2024)

Pak-BCH team has recently visited various organizations involved in the research and development of GMOs/LMOs. The facilities were classified as public and private entities actively engaged in advancing agriculture. It included both public and private sector institutes/companies located in Lahore, Faisalabad, and Multan. The team visited the laboratory facilities and fields allotted for conducting trials.

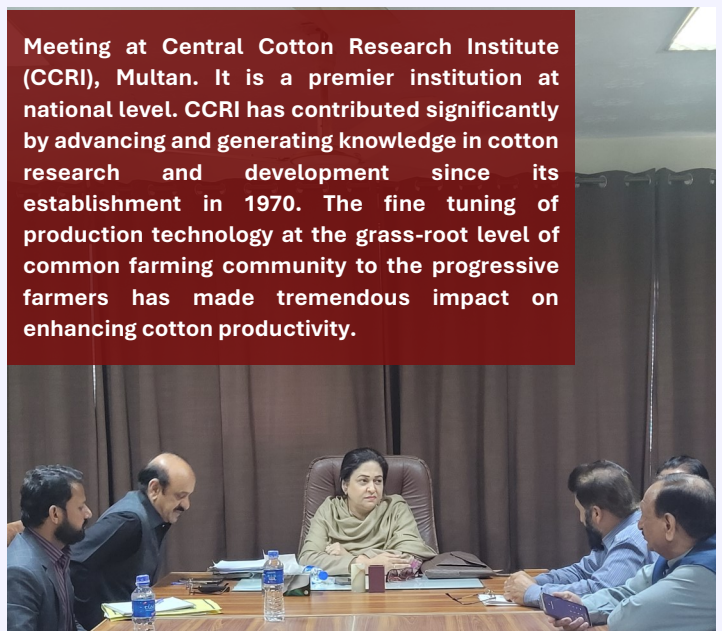
Meeting with CropLife International team. It is a global consortium that represents the plant science industry. They address issues related to crop protection (i.e. pesticides) and agricultural biotechnology. It aims to grow more food for more people on less land with great efficiency to obtain a safe and secure food supply.



HIGHLIGHTS OF THE MEETINGS



Meeting at Muhammad Nawaz Sharif University of Agriculture, Multan (MNSUA). MNSUA is committed to establish a standard experiential learning and provide a platform for research and improvement in Plant Breeding System through integrating conventional plant breeding techniques and modern biotechnological tools, seed production and supply system, and good agriculture practices at farmer's field to obtain high yield of better-quality produce to ensure food security.



Meeting at Central Cotton Research Institute (CCRI), Multan. It is a premier institution at national level. CCRI has contributed significantly by advancing and generating knowledge in cotton research and development since its establishment in 1970. The fine tuning of production technology at the grass-root level of common farming community to the progressive farmers has made tremendous impact on enhancing cotton productivity.



Meeting with Tara Group Team followed by a short field visit. Tara Group is working on the development of seeds that will increase the quality and quantity of agriculture produce. They mainly work on cotton and wheat varieties. The seeds are thoroughly processed in the laboratory and then tested on the fields.



Lab visit at Four Brothers Private Limited, Lahore. Four Brothers Group is a group of industries inspiring modern solutions in agriculture, genetic research & development. They provide a wide array of pesticides and seeds of different crops, development, and transformation of genes against pests and diseases.



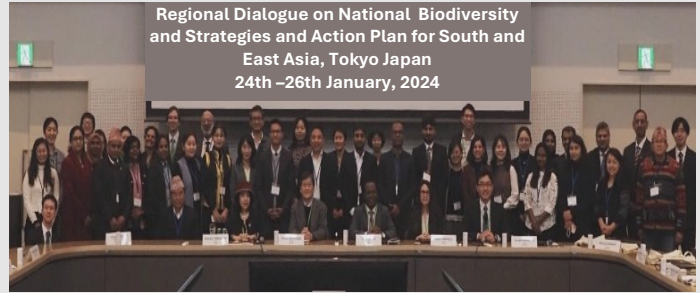
A Meeting conducted with Weal-AG Corporation team. They aim to produce international standard high-quality seeds at competitive prices. They mainly work on seeds of cotton, wheat, rice, corn hybrids, berseem, and various types of vegetables from registered growers. Weal AG is providing imported rice & vegetables hybrids to fulfil the needs of the market.

Acknowledgement

The Pak-EPA team sincerely extends its heartfelt gratitude to CEMB, University of Veterinary and Animal Sciences (UVAS), University of Agriculture, Faisalabad (UAF), MNSUA, NIBGE, CCRI, CropLife International, Four Brothers Private Limited, Tara Group and Weal AG Corporation for their invaluable assistance during field visits and monitoring activities. Their support and insight have helped us to achieve our goals in assessing data and other field related information. We look forward to continued partnership and collaboration in our future endeavors.

International Participation: Convention on Biological Diversity (CBD)

In 1992, Pakistan signed the Convention on Biological Diversity (CBD) and its formal ratification in 1994. A Biodiversity Action Plan (BAP) was approved by Pakistan in 2000 to implement the CBD nationally. National Biodiversity Strategies and Action Plans (NBSAPs) are crucial instruments for implementing the CBD at the national level. Despite facing many challenges, Pakistan has actively participated and adopted a strategic plan for biodiversity from 2011.



DG PAK-EPA representing Pakistan at Regional Dialogue on National Biodiversity and Strategies and Action Plan for South and East Asia at Tokyo Japan on 24th–26th January, 2024.

Upcoming event	Date & Venue
11th COP/MOP meeting of the Cartagena Protocol	21 st October - 1 st November, 2024 at Cali Columbia
Nineteenth meeting of the Compliance Committee under Cartagena Protocol on Biosafety	30 th April - 2 nd May at Montreal Canada

Future Perspectives

- Enforcement of National Biosafety rules, 2005 amended 2024 and implementation of Cartagena Protocol.
- Establishing partnerships with regional and international organizations by harmonizing data and reporting.
- Ensuring the safety of the food by regulating the import and usage of the LMOs/GMOs.

Meet the BCH Team



The dedicated team of Pakistan Environmental Protection Agency (Pak-EPA) who are playing a vital role in regulating the GMOs in Pakistan.

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