

CEMB

Centre of Excellence in Molecular Biology
University of the Punjab, Lahore, Pakistan



www.cemb.edu.pk

Contents



ABOUT US

01



VISION / MISSION

03



OUR LABS

04



OUR PRODUCTS & SERVICES

14



CEMB CULTURE

16



CONTACT US

21





About Us

The Centre of Excellence in Molecular Biology (CEMB), University of the Punjab, Lahore, is one of Pakistan's leading institutes for research, education, and innovation in molecular biology. Visionary discussions in 1979 between Prof. Ahmed Iqbal Bukhari of Cold Spring Harbor Laboratories and Prof. Dr. Sheikh Riazuddin led to its establishment in 1986, in response to Pakistan's growing need for advanced research in health, agriculture, and biotechnology. Prof. Khairat Ibne Rasa, then Vice Chancellor of the University of the Punjab, and Prof. Abdul Rauf Shakoori of the Department of Zoology played a fundamental role in establishing the Centre. Moreover, its vision was further refined through the guidance and contributions of Nobel Laureates and renowned scientists, including J.D. Watson, Richard J. Roberts, Larry Grossman, Tomas Lindahl, and Thomas Friedman.

CEMB's research is focused on improving human health, enhancing crop traits, and developing biotechnology-based solutions for societal benefit. The Centre was the first in Pakistan to clone human interferon, establish an in-house repository of PCR enzymes and kits, and develop stem cells-based regenerative medicines for diabetic wounds, ocular repair etc. It remains a national leader in identifying genetic mutations associated with inherited disorders—including hearing loss, visual impairments, neurodevelopmental conditions, and various types of cancer. The Centre also pioneered the development of transgenic cotton varieties that are climate resilient and capable of withstanding harsh environmental conditions. These varieties feature improved yield potential and superior long fibre quality. Furthermore, the commercialization of insect- and herbicide- resistant cotton has resulted in up to 30% savings per acre in production costs, contributing significantly to national agricultural productivity and economic growth.

The CEMB campus spans 60 acres and features state-of-the-art research and teaching facilities, including specialized laboratories in Agricultural Biotechnology, Forensics, Virology and Infectious Diseases, Genetic Disorders, Biopharmaceuticals and Vaccinology, Functional Genomics, Nutraceuticals, Molecular Medicine, Genetic Screening, and Stem Cells and Regenerative Medicine. The campus also includes greenhouses, an animal house, a mosque, an auditorium, a guest house, and hostels.

CEMB offers internationally aligned M.Phil./Ph.D. programs, hands-on training, and short courses for diverse professionals. Its national and global partnerships with NIH, CDC, EU, TWAS, and others drive scientific advancement in Pakistan. Today, CEMB stands as a premier hub of excellence in molecular biology, committed to creating knowledge, building capacity, and delivering innovative solutions for national development.

Leadership Messages

Beacon of Beginnings



Late PROF. DR. SHEIKH RIAZUDDIN (H.I., S.I., T.I.)

It is a natural phenomenon that active logarithmic growth eventually ceases and is inevitably followed by a stationary phase (as in a bacterial growth curve). Similarly, visionary leaders in strong institutions anticipate global trends and adapt strategies to address emerging challenges. CEMB is poised for a new era under the leadership of a young and dynamic director, ready to anticipate and tackle future challenges. With a solid infrastructure and unique genetic resources already in place, success depends on vision, dedication, and collaborative efforts. As our Quaid said, "United we stand, divided we fall." Let us work together with passion and unity to achieve the extraordinary.

Chairman BOG



PROF. DR. MUHAMMAD ALI (S.I., T.I.)

Welcome to the Centre of Excellence in Molecular Biology (CEMB), a distinguished research institute under the University of the Punjab. CEMB is at the forefront of innovation in health, agriculture, and biotechnology, addressing vital challenges through impactful research and global collaborations. As Chairman of the Board of Governors, I take pride in CEMB's contributions to advancing science, nurturing talent, and driving solutions that benefit society. Let us continue to support its mission for progress and excellence.

Director



PROF. DR. MOAZUR RAHMAN

As Director, I am committed to ensuring that CEMB continues to make valuable contributions to science. To this end, I aim to strengthen linkages with industry, support innovation in cutting-edge product development, promote commercialization of developed products, engage policymakers for making informed decision pertaining to science, and provide an intellectually-stimulating environment to both young and established researchers for molecular biology research, education, and training. May Allah give us strength to achieve our goals.

Our Value

Vision

Our vision is to establish a leading center of excellence in molecular biology and recombinant DNA technology that drives innovative research and development, advancing agriculture, the pharmaceutical industry, environmental sustainability, stem cell technology, and genetic disease treatment in Pakistan and beyond.

Mission

As an institute of molecular biology, our mission is to advance knowledge and innovation in the field through rigorous research, skilled workforce training, and higher education, including Ph.D. and M.Phil. programs. We strive to provide essential research tools, address scientific challenges in health and agriculture, and foster scientific discourse by organizing national and international seminars. Our focus is on driving impactful advancements in molecular biology to improve health, agriculture, and sustainable development.



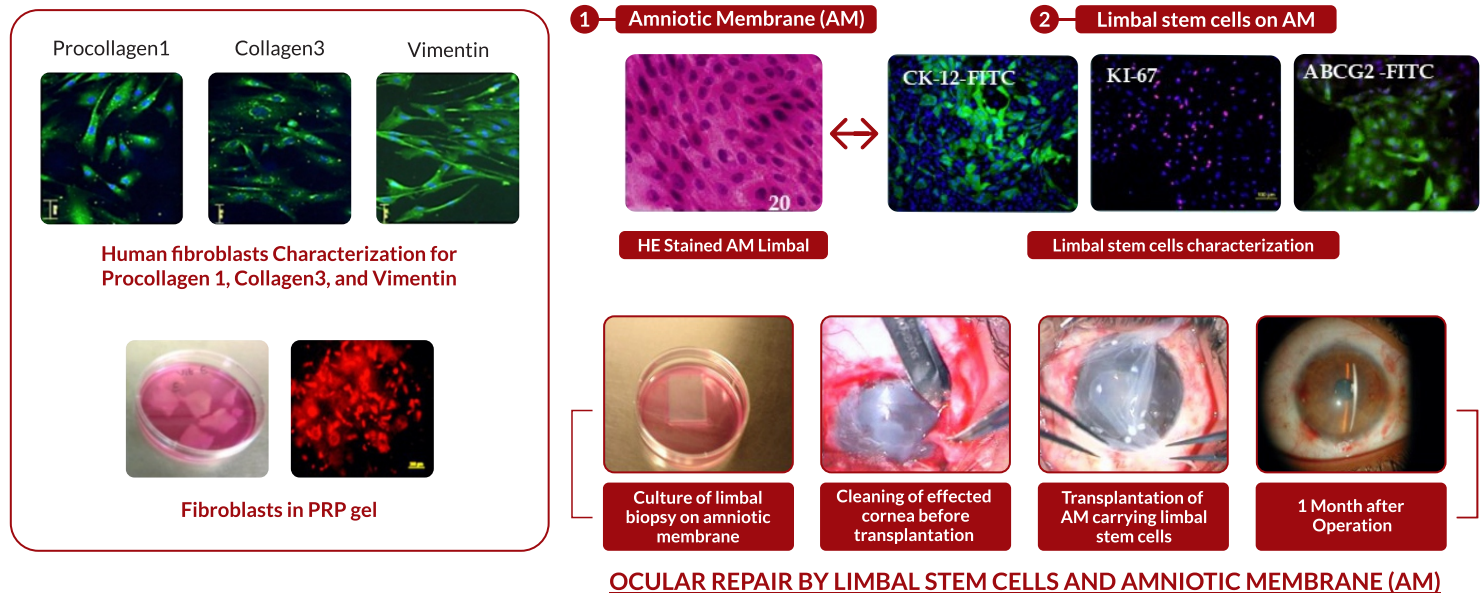
Our Labs



STEM CELLS LAB



- The lab is developing stem cells to repair and restore damaged tissues in skin, liver, cartilage, spinal cord, pancreas, and eyes.
- Successfully applied CEMB-developed stem cells for burnt skin reconstruction, ocular repair, diabetic wound healing, and autism treatment, showing promising results in clinical trials.
- Developing induced pluripotent stem cells (iPSCs) from genetic disease patients and enhancing stem cell therapies with antioxidants, phytoextracts, and growth factors.
- Partnering with leading local hospitals (Jinnah Burn Centre Lahore, Ganga Ram Hospital Lahore) and international institutions (Leipzig University, Johns Hopkins, University of Miami).
- Combining stem cells with chitosan hydrogels, platelet-rich plasma, amniotic membranes, and silk fibroin scaffolds for improved therapeutic efficacy.

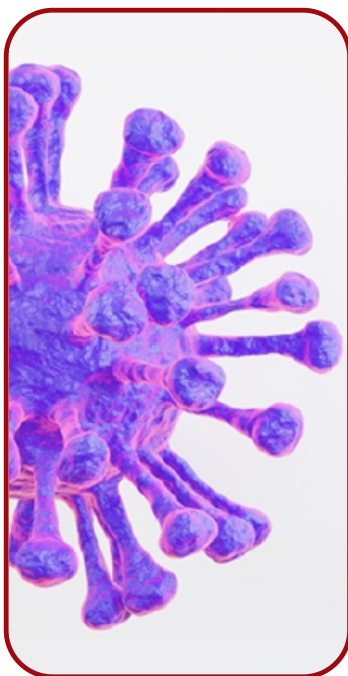


BIOPHARMACEUTICAL LAB



- The lab is working on advancing cost-effective alternatives for essential biopharmaceutical drugs to improve healthcare accessibility.
- Successfully developing FDA-approved biosimilars for treating neutropenia, rheumatoid arthritis, multiple sclerosis, and cancer.
- Successfully producing essential therapeutic proteins, including Filgrastim, Sargramostim, Proleukin, Nakinra, Insulin, Interferon β , and Neumega.
- Commercialized high-quality PCR enzymes and ready-to-use PCR kits for enhanced molecular diagnostics.
- Exploring nanoparticle-based drug delivery systems (Exosomes, PLGA, Chitosan) for more effective anticancer therapies
- Development of vaccines for poultry and livestock





MOLECULAR VIROLOGY & INFECTIOUS DISEASES LAB



- The lab is investigating viral epidemics, genome analysis, host-virus interactions, diagnostics, vaccine development and HCV-induced diabetes.
- Exploring CRISPR/Cas13-based antiviral strategies.
- Developing therapeutic vaccines for HPV-induced cervical cancer.
- Generated revenue of 650 million PKR, in 2013, by providing qualitative and quantitative tests for HBV and HCV.
- Published 260+ peer-reviewed papers with over 7000 citations; also produced 47 PhD and 61 MPhil graduates
- Collaborating with CDC (USA), Rice University (USA), University Grenoble Alpes (France), Queen Mary University of London, and Abu Academia University (Finland).



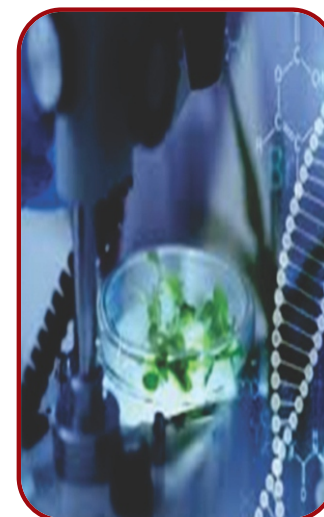
APPLIED & FUNCTIONAL GENOMICS LAB



- The lab is integrating genomics and natural compounds to discover and optimize therapeutic agents for cancer and infectious diseases.
- Identified two anti-HCV compounds from indigenous plants and developed a fibrosis-cirrhosis index for chronic HCV.
- Discovered a novel HCV NS5B inhibitor and investigated natural compounds like Euphorbia pilulifera for hepatoprotective effects.
- Uncovered miRNA-221 as a potential breast cancer biomarker and explored lncRNA MALAT1's role in cancer progression.
- Developed a SARS-CoV-2 Protease and Spike gene stably expressing cell culture system for antiviral research.

MEDICAL BIOTECHNOLOGY LAB

- The lab focuses on combating multidrug resistance and cancer using bacteriophages, plant-based antimicrobials, and miRNA silencing.
- Filed 8 patents and submitted 13 novel sequences to the NCBI Gene Bank.
- Pioneered protein purification technologies, identified novel Bt receptors, developed Bt crops, and introduced GMO detection methods and biosensors in Pakistan.
- Discovered bacteriophages, advancing bacteriophage therapy, and developing cost-effective polyclonal and monoclonal antibodies for diagnostics and therapeutics purposes.
- Along with that, production of molecular tools for two decades, to make science affordable and self sustainable.



NUTRACEUTICALS & MICROBIAL BIOTECHNOLOGY

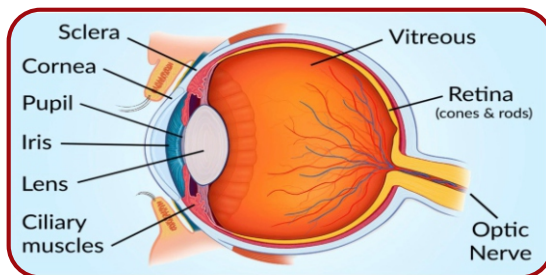
- The lab is utilizing non-GMO and GMO approaches to tackle health, livestock, and Halal food enzyme challenges.
- Screened over seven local plants for anti-cancer and anti-Alzheimer properties using non-GMO methods.
- Developed self-sustainable mosquito larvicidal algae, with field trials in progress.
- Engineered algae as a Halal expression vector for the production of recombinant chymosin for the food industry.
- Filed two patents on mosquito larvicidal algae and yeast expressing non-glycosylated hEGF proteins for therapeutic applications.



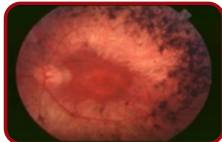
GENETIC DISEASES LAB



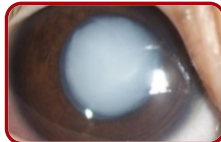
- The Genetic Diseases lab is investigating molecular pathways of congenital hearing and vision impairments, intellectual disabilities, neurodegenerative diseases, and rare conditions.
- Identifying affected families, obtaining consent, and collecting samples for genetic research.
- Offering single-gene sequencing for precise diagnosis of hereditary disorders.
- Providing prenatal genetic testing to detect genetic abnormalities before birth.
- Conducting exome sequencing analysis for comprehensive diagnosis of complex genetic conditions.



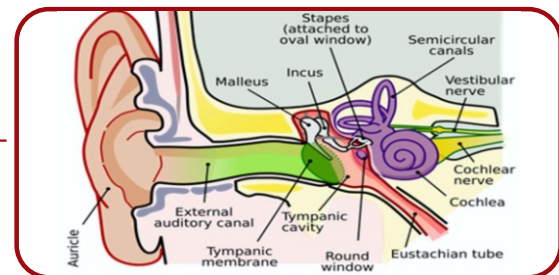
RETINITIS PIGMENTOSA



CONGENITAL CATARACT

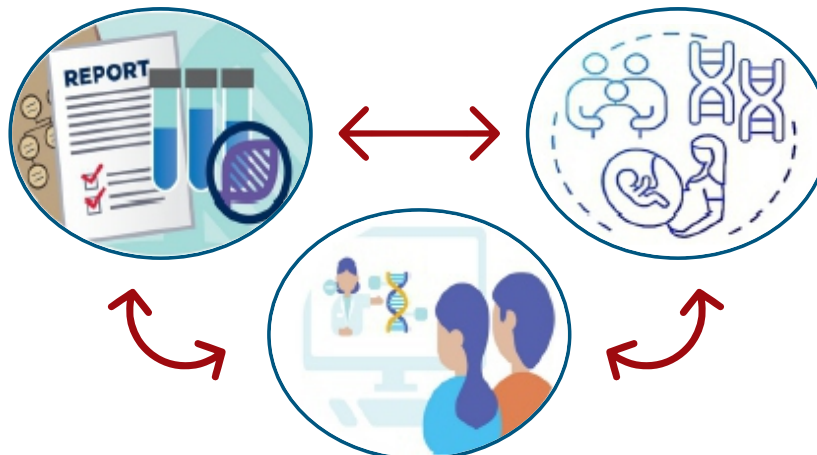


CONGENITAL GLAUCOMA



Syndromic Hearing Impairment

Non-Syndromic Hearing Impairment



GENETIC SCREENING FACILITY



- The lab specializes in cost-effective genetic testing and profiling using third-generation sequencing technology to diagnose hereditary conditions.
- Commercialized cost-effective BRCA1/2 screening for early cancer detection, funded by Pakistan Academy of Sciences with 8.63 Million PKR.
- Genotypic categorization of chronic obstructive lung disease patients based on Vitamin D receptor SNPs, funded by NRPU-HEC with 7.8 Million PKR.
- Identifying genetic variants linked to Congenital Hypogonadotropic Hypogonadism in the Pakistani population in collaboration with University of Lausanne, Switzerland. (<https://data.snf.ch/grants/grant/202612>)
- Affordable genetic profiling for pediatric respiratory diseases and promoting early detection through NGO seminars and corporate collaborations.

**ADVANCED
GENETIC
SCREENING**
BRCA1&2 NGS TESTING

Let's collaborate for better
patient outcomes

CONTACT US TODAY

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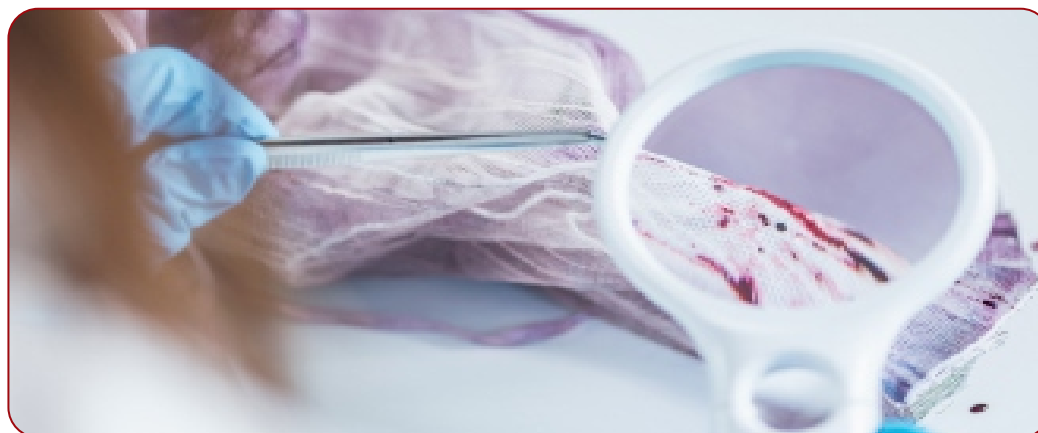
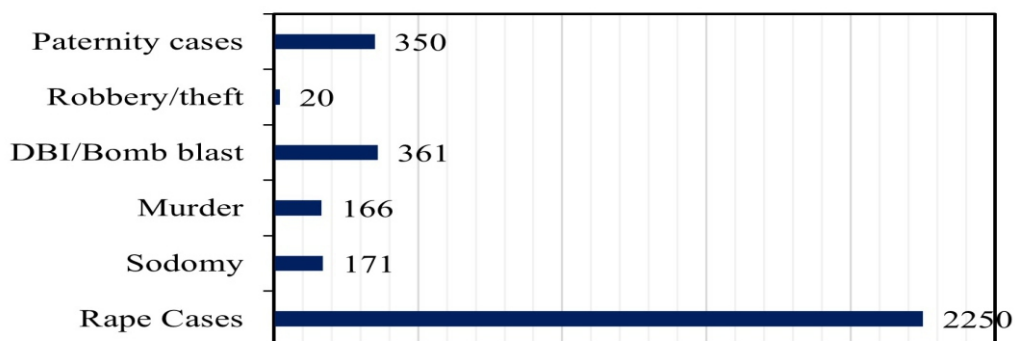
CEMB

FORENSIC RESEARCH LAB



- The Forensic Research lab specializes in DNA typing and STR analysis for accurate forensic profiling, including degraded samples.
- Successfully solved cases of paternity, murder, rape, sodomy, and dead body identification.
- Developed a genetic database for improved forensic investigations.
- Submitted 3 patents related to forensic science technologies.
- Investigating the genetic etiology of suicidal behavior with serotonin-related genes in psychiatric patients.
- Conducting mRNA-based wound age estimation for burns, aiding in forensic investigations.

Forensic Cases solved >3500

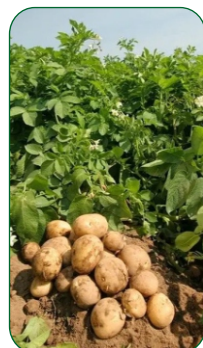


AGRICULTURE MOLECULAR BIOLOGY



PLANT BIOTECHNOLOGY LAB

- Plant Biotechnology Lab is advancing plant molecular biology and biotechnology using CRISPR-Cas systems for genome editing and transgenic solutions.
- Developing genetically modified cotton varieties with up to 99% insect resistance, effective weed control, Enhanced cotton fiber quality and and RNAi-based virus protection to reduce yield losses and labor costs.
- Exploring genome editing in potatoes to improve nutrition, reduce storage sweetening, and increase resistance to major diseases.
- Developing plant-based edible vaccines for poultry diseases like NDV and Avian Influenza, currently in trials.
- Recognized through prestigious awards and funded by agencies like PARB, HEC, PSF, and IsDB for groundbreaking research.



PLANT GENOMICS LAB

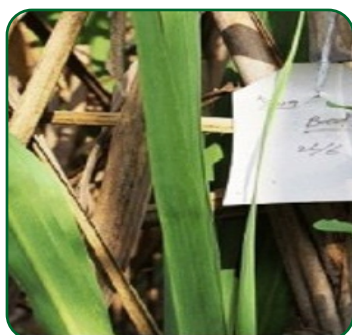
- The lab is characterizing plant genomes to understand genetic mechanisms of abiotic stress tolerance.
- Investigating plant adaptations to extreme conditions like high salinity, drought, and temperature variations.
- Utilizing genome sequencing data to explore physiological, biochemical, and metabolic pathways for crop improvement.
- Studying Agave sisalana as a bioenergy crop for biomass production and CO₂ absorption to address global energy challenges.
- Developing climate-resilient crops to support sustainable agriculture, food security, and resource conservation.



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- Developing climate-resilient crops to support sustainable agriculture, food security, and resource conservation.

SEED BIOTECHNOLOGY LAB

- Seed Biotech Lab is also engaged in improving traits (insect pest, herbicide and disease resistance) of economically important crops like Soybean, rapeseed and mustard, tomatoes, potatoes, sugarcane and corn.
- Developed pest-resistant cotton varieties expressing cry1Ac and cry2A genes, approved by the Punjab Seed Council.
- Conducting field trials for herbicide-tolerant maize hybrids and advancing dsRNA-based biopesticides using RNAi and CRISPR-Cas9.
- Providing DNA fingerprinting and GMO identification services to support regulatory compliance and seed authentication.
- Contributing to sustainable farming and food security in Pakistan through cutting-edge agricultural biotechnology.



OUR PRODUCTS & SERVICES OFFERED

Stem Cells for Arthritis, Autism, wound healing , Ocular repair



0-Day



3-Day



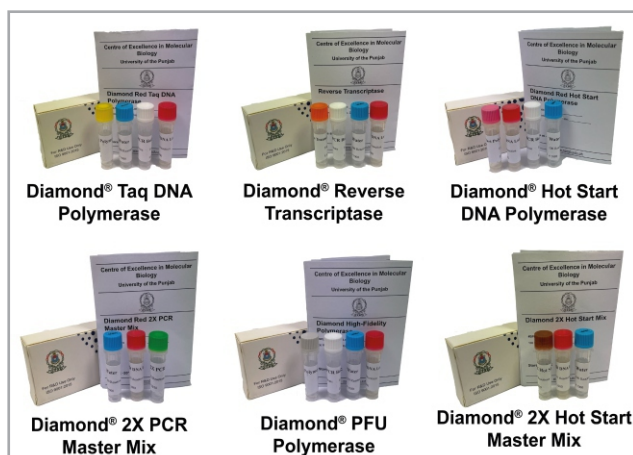
7-Day



14-Day

Diabetic foot ulcer Repair by Stem cells

Enzymes and Kits



Diamond® Taq DNA Polymerase

Diamond® Reverse Transcriptase

Diamond® Hot Start DNA Polymerase

Diamond® 2X PCR Master Mix

Diamond® PFU Polymerase

Diamond® 2X Hot Start Master Mix

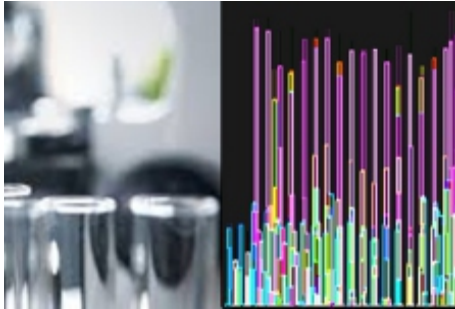
Animal house facility



COMMERCIAL COTTON VARIETIES

- CKC-01
- CKC-03
- CKC-06
- CKC-05
- CEMB-33
- CEMB-AAS3
- CEMB-66
- CEMB-100
- CA-12

Genetic testing, Molecular Diagnostic testing, Audiometry, ERG & Genetic Counselling



- **GMO Testing**
- **DNA Profiling**
- **Pathogen Detection**
- **IRGA**
- **FISH**

Green House



CEMB Culture



Founding Director CEMB, Prof. Riazuddin (Late)
presenting souvenir to
Prof. Dr. Kauser Abdulla Malik



The Winning Team from CEMB at PINTECH 2025



Honorable scientists and academicians at concluding ceremony; CEMB Vaccine Conference 2024



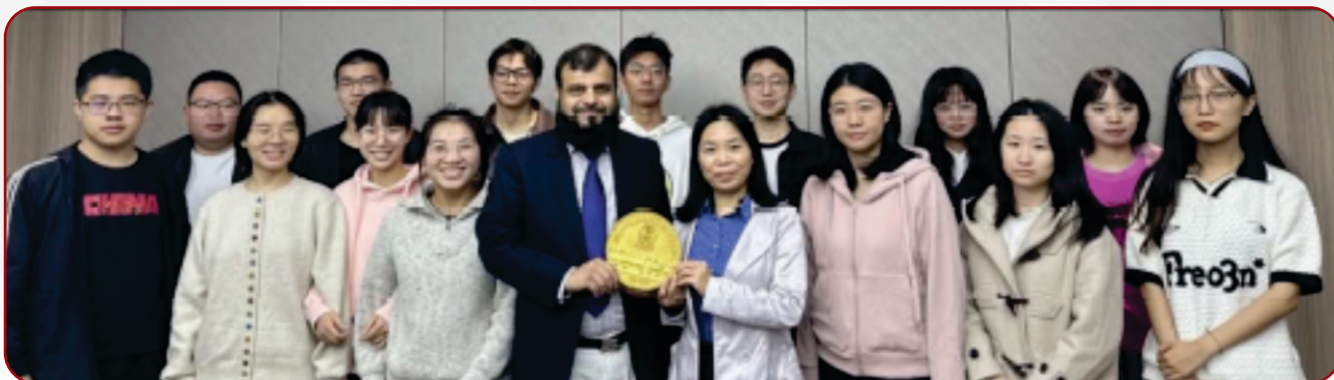
Director Prof. Moaz and CEMB family welcome Prof. Muhammad Ali, VC University of the Punjab



Iranian delegation being briefed at CEMB labs



Joyful cap toss after convocation



Director CEMB,s Collaborative visit to Chinese universities



CEMB Faculty hosts reception dinner for
Punjab University VC



DAAD delegation from German being briefed about
ongoing research at CEMB



Inauguration of CEMB 400kw Solar System



Corps Commander Lahore visits
CEMB Punjab University



Christmas Celebrations



Trophy being presented to winning cricket team
at CEMB sports gala



**Breast cancer awareness walk
at CEMB**



**Delegation from the
Chinese Academy of Agricultural Sciences Visits CEMB**



Showcasing CEMB Research to Governor Punjab



IAEA Delegates Visit CEMB



**CEMB wins positions in 10th invention
to innovation Summit-PU**



**Recreational trip to northern areas
of Pakistan**

CEMB FACILITIES



CEMB Guest House & Hostels



Guest House



CEMB Solar System



Mosque



Lecture Room



Riazuddin Auditorium

Let's Connect !



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For CEMB Achievements



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