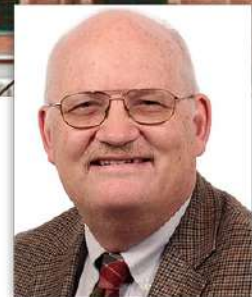




FORMAN CHRISTIAN COLLEGE
(A CHARTERED UNIVERSITY)

KAUSER ABDULLA MALIK SCHOOL OF LIFE SCIENCES (KAM-SLS)





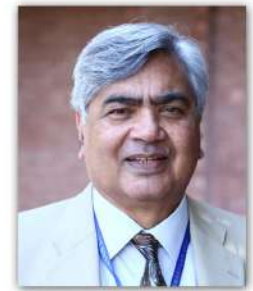
Message from the Rector
Dr. Jonathan Addeleton

Life Sciences has been an area of special interest to Forman Christian College since its founding in 1864. More recently, following Forman's emergence as a chartered university in the early 2000s, teaching and research in this field has taken on added significance, as suggested by the emergence of a Department of Biological Sciences following the merger of our Zoology and Botany Departments in 2006. This Department now offers undergraduate and graduate degrees in Biological Sciences (since 2006), Biotechnology (since 2008) and Environmental Sciences (since 2009).

All these programs are housed in the five-story Armacost Science Building, situated at the center of our campus and purpose-built to accommodate a variety of expanding science-related initiatives. Support from Pakistan's Federal Government, the Government of Punjab and the US Agency for International Development (USAID) helped make this building possible. At the same time, the construction of new facilities was accompanied by the hiring of competent faculty, in turn attracting larger numbers of qualified students and resulting in a sixfold increase in enrollment. Pakistan's Higher Education Commission (HEC) also recognized these positive developments, granting Forman "W" category status and enabling it to compete for HEC research grants -- something we have done with increasing success in recent years.

Forman has now developed to the point where its Department of Biology can be appropriately viewed as both a national and international hub, providing a home for a growing community of scholars and students committed to both teaching and research. Against this backdrop, the Department was upgraded to a School of Life Sciences (SLS) in 2018, providing further visibility as well as new opportunities for research and innovation. At the same time, this expansion in the vision and mission of our program further strengthened interest on the part of prospective corporate supporters, government entities and international donor agencies. In view of Dr. Kauser Abdulla Malik's contributions, the school has been named after him in 2020 and became Kauser Abdulla Malik School of Life Sciences (KAM-SLS).

Looking ahead, I am confident that KAM-School of Life Sciences will continue to flourish, achieving its vision of strengthening and consolidating its position as a center for excellence that combines rigorous academic standards with practical, hands-on approaches to the challenges that Pakistan faces in key sectors such as agriculture, health, industry and the environment.



Dr. Kauser Abdulla Malik HI,SI,TI
Dean, Postgraduate Studies

School of Life Sciences (SLS) has its origin in the Department of Biological Sciences which has a history of nearly 100 years. However since the up gradation of FCC to a University, the Department has developed on modern lines focusing on teaching and research while meeting all the requirements of liberal arts education. Efforts have also been made to encourage multidisciplinary and interdisciplinary approach to research. With these objectives in view, we have been able to attract internationally renowned faculty with expertise in various disciplines of science namely biochemistry, genetics, molecular biology, microbiology, bioinformatics etc. Research activities relate to health, agriculture, food, environment and industry. Availability of such an expertise enabled us to initiate different graduate and postgraduate programs. Our faculty has been able to win competitive research grants worth nearly 150million over the last seven years. This has enabled us to equip the laboratories with state of the art facilities and to support graduate and postgraduate students. In addition liberal funding by the University for providing infrastructural support has been crucial for the development.

Several of the funded projects have been successfully completed resulting in several publications. Efforts are continuously being made to develop linkages with the end user industry may it be in agriculture, food , pharmaceutical or medical institutions. Several MoUs in this regard have been signed.

In view of the expansion in the research and educational activities in Life Sciences we envisage additional laboratory space and lecture rooms in the coming years for which Corporate Support from the Industry and from national and international philanthropists is being solicited.



Dr. Samina Mehnaz
Chairperson KAM-SLS

The mission of Kauser Abdulla Malik School of Life Sciences (KAM-SLS) is to inspire, educate and transform our students by providing an innovative and ingenious learning experience that prepares them to flourish in the dynamic and demanding practical world. Our school offers programs focusing on Biological Sciences; Biotechnology; Food Safety and Quality Management; and Molecular Pathology and Genomics. Our curriculum is designed to meet the diverse interests of Life Sciences students. The school programs are supported by 22 competent, well-qualified, and enthusiastic faculty members (all PhDs) and 15 scientific assistants.

In addition to quality teaching, we also strive for excellence in research. At KAM-SLS we believe that the best way to train the future generation of scientists is to give them the opportunities to take part in cutting edge research themselves. KAM-SLS has the facilities and infrastructure to undertake research in advanced Agricultural, Food, Microbial and Medical biotechnology using all the developments in genomics, proteomics, transcriptomics, metabolomics, and phenomics to solve the real-world problems of health, food and agriculture. It has established close collaborations with many high-level scientific research institutions around the world.

Our postgraduate students are the main players involved in innovation and scientific pursuits. Research is being conducted on Microbiome profiling of Cotton, developing Herbicide-resistant Wheat, Drought and Salt tolerance in Wheat, Bio-fortification, Bio-fertilizer, Bio-pesticides, Bacterial Metabolites, Autism, Neurological disorders, Obesity, Molecular Oncology, Bio-markers, Epi-genetics, Human Papilloma Virus, Tuberculosis, Gluten free products, Food preservation, Starch modification, Bioactive compounds from food byproducts and production of fruit leather.

We are proud of and value the diversity in our staff and students. We are committed to the highest standards of professional integrity and strive to provide an environment where everyone in the school can work and grow to the best of their abilities.

Degree Programs at KAM-SLS

BS Biotechnology (Four years Degree)

BS Biological Sciences (Four years Degree)

**MPhil Biotechnology
(Two years Postgraduate Degree)**

**MPhil Molecular Pathology and Genomics
(Two years Postgraduate Degree)**

**MPhil Food Safety & Quality Management
(Two years Postgraduate Degree)**

PhD Biotechnology

The KAM-SLS presently covers an area of 65,500 square feet within the Armacost Science Building. In addition, it also has a botanical garden on the east side of the campus covering about 7 acres. The school programs are supported by 20 faculty members (all PhDs) and 15 scientific assistants. It has 12 research laboratories associated with several lecture rooms. In addition, the research and teaching facilities are supported by a green house, more than an acre of agriculture land for field trials, two climate rooms, a natural history museum, a herbarium, a seminar room and a store besides the faculty offices.



The MPhil and PhD degree programs along with the consolidated research accomplishments have made a visible contribution to the scientific community and hopefully its impact will soon be visible in the society too. One of the missions of the school is to impart quality education through research for producing scientific manpower fully equipped for tackling problems of food security, health and environment.



Since at FCCU fee structure is relatively higher than public sector universities, FCC makes extra effort in ensuring that students should not give up their dreams of education because of financial constraints. The university, therefore, dedicates a significant portion of its budget each year in order to provide financial assistance to its deserving and academically eligible students. Last year FCCU was able to provide financial assistance to 2,250 students. All this has made possible by generous financial support by philanthropist and socially responsible ambassadors of the society.

MEET THE FACULTY



Dr. Kauser Abdulla Malik HI,SI, TI
HEC Distinguished National Professor and Dean of Postgraduate studies, PhD - University of Aston, U.K.
AvH Fellow (Germany), Publications: 300+

Our group is focused on molecular biology of plant microbial interaction leading to the development of bio-fertilizers. Our recent research in plant biotechnology lead to the development of transgenic wheat with increased bioavailability of iron and zinc. In addition, work on developing transgenic wheat for increased fertilizer use efficiency is underway. Other research interests relate to meta-genomics of extreme environments with the objective of mining novel osmoregulatory genes to be used for transformation of economic crops.

Dr. Samina Mehnaz
Professor and Chairperson, PhD - Quaid-e-Azam University, Islamabad
Pre & Post Docs (U.S.A., Canada, Belgium), AvH Fellow (Germany), Publications: 72



Main objective of our group is to minimize the use of chemicals in agriculture. For this purpose we are working on formulating bio-fertilizers & bio-pesticides for economically important crops. Our group has more than 200 bacterial strains identified on the basis of biochemical tests and 16S rRNA gene sequences. These have been isolated from soil and plants growing in diverse environments including mesophytes, halophytes and xerophytes. These isolates are screened for plant growth promoting properties and subsequently tested in the lab and in the field. Their secondary metabolites are extracted, identified and characterized by using, TLC, HPLC, MS and NMR. Purified compounds are screened for their anti-microbial and anti-cancer

Dr. Muhammad Arslan, FPAS, SI
Distinguished Research Professor, PhD - University of Wisconsin, U.S.A.
Publications: 100+



Our research is focused on endocrinology; metabolic disease, obesity & diabetes and reproductive endocrinology. Our recent research is in the area of genetics and metabolic spectrum of severe obesity in the Pakistani population. In addition, we are also interested in the effect of metabolic disease on the reproductive axis in consanguineous families.

Dr. M. Rehan Siddiqi
Professor Emeritus
PhD - Miami University, U.S.A., Post Doc. Daad Germany., Publications: 13



Our group is interested in the comparative anatomy of Ranalian complex. We are also focused in the area of ecological anatomy and anatomy of plants growing in acid environment.

Dr. Wajahat Hussain
Professor and Controller of Examinations
PhD - University of Florida, U.S.A., Publications: 23



Our research interests include long-term effects of rising CO₂ levels in the atmosphere on crop plants and interactive role of high temperature and CO₂ on enzymes of carbohydrate metabolism; bio-chemical transformations during early stage of seedling development in cereal crops and the effects of heavy metal pollution on soil and plants.

Dr. Aftab Bashir
Professor, PhD - University of Illinois, U.S.A.
Post Doc. U.S.A. and U.K., Publications: 50



Our group mandate is to address food security under the changing climatic scenario. We are focusing our efforts on the utilization of transcription factors involved in improved carbon partitioning, better nitrogen uptake and greater heat tolerance in wheat, maize and chickpea. The transcription factors involved in spike branching and double podding in wheat and chickpea, respectively are the other area of our interest. Several transcription factors and genes involved in these processes have been selected and are being transformed in wheat by the conventional *Agrobacterium* mediated methods. In addition to the classical GM technology, we are trying to adopt the precision genome engineering technology for achieving our goals on better crop yield and improved nutritional value.



Dr. Muhammad Irfan
Professor, PhD - CEMB, University of Punjab, Lahore
Post Doc. CEMB (Pakistan), Publications: 24

Our research interest includes plant genomics and genetic improvement of crop plants through *Agrobacterium* mediated transformation. Currently our group is focusing on the development of bio-fortified wheat with increased iron and zinc bioavailability (funded by PARB), enhancing fertilizer use efficiency in wheat (funded by ALP), development of new herbicide trait in wheat and cotton (funded by PARB) and enrichment of wheat with vitamin B6 (funded by HEC).

Dr. Asma Maqbool
Professor, PhD - CEMB, University of Punjab, Lahore
Publications: 32



Our research field is Genetic improvement of crop plants through *Agrobacterium* mediated transformation. Currently, we are focused on wheat & have developed bio-fortified wheat with increased iron and zinc bioavailability (funded by PARB) and transgenic wheat with enhanced phosphorous uptake (funded by PSF). Recently we have three funded projects; one is related to enhance fertilizer use efficiency (funded by ALP), other is to introduce new herbicide character in wheat and cotton (funded by PARB), and third one is enrichment of wheat with vitamin B6 (funded by HEC). In future we are planning to evaluate the field performance of our previously developed transgenic wheat.



Dr. Deeba Noreen Baig
Professor, PhD - SBS, University of Punjab, Lahore
Post Docs (Pakistan, Japan & U.S.A.), Publications: 21

Our research group is focusing on developing early diagnosis and intervention techniques for the autism spectrum disorders (ASD). There are still no specific molecular markers of ASD, but by using modern molecular screening techniques on patient samples (blood/saliva) we hope to identify specified genetic factors responsible for ASD. These biomarkers have the high potential to be used by clinicians as an early diagnostic tool for ASD. Moreover, we are also revealing the expression of certain unknown cytoskeletal genes involved in brain tumorigenesis. Using cutting edge research on fresh and archive tumor samples, we are analyzing transcriptional up/down regulation and mutations in the genes linked to tumor formation.

Dr. Aisha Saleem Khan
Associate Professor, PhD - University of Punjab, Lahore
Post Doc (U.S.A.), Publications: 17



Our group research interests involve finding solutions to overcome heavy metal toxicity by evaluating different parameters in economically important plants. Currently, we are working on a project about possible role of hydrophytes i.e., water lily and lotus as hyper accumulators. In addition, we are working to develop transgenic aromatic *E. coli* / *Pseudomonas* sp. by incorporating the genes for terpenoid biosynthetic pathways (which form aromatic molecules in plants) from *Rosa* sp. by using appropriate plasmid.

Dr Muhammad Imran
Associate Professor, PhD - The University of Manchester, U.K.
Post Doc. & Industrial experience U.K., Publications: 12



We are interested in studying proteins from various sources with an objective of evolving them for commercial exploitation. Our core interests in this area include the rational improvement of commercial phytase templates, their expression and purification for food and feed use; the evolution of atrazine degrading proteins and their testing in plants (tobacco, wheat and cotton); expression, purification and assay development of insect cholesterol esterase for development of chemical control; isolation and commercialization of food/feed related proteins and the study of halophytic and xerophytic plant associated bacterial proteome to discover proteins for plant engineering.

Dr. Muhammad Zubair Yousaf
Associate Professor, PhD - CEMB, University of Punjab, Lahore
Post Doc. China, Publications: 32



Realization of "One Health Concept" in Pakistan is our top research priority. The focus areas are bio-surveillance, molecular epidemiology and pathology of infectious/zoonotic diseases for early disease perception. We are also working in the area of the application of nano-biotechnology & nutrigenomics (transcriptome, metabolome and proteome) to offer safe, cost-effective and efficient poultry feed/ingredients that in turn will result in economic benefits, safe & healthy meat and egg production. Another area of interest is to elucidate the mechanisms behind cancer development due to infection, diet and nutrition and its nano-technology based therapeutics.

Dr. Muhammad Bilal Sadiq
Associate Professor
PhD - Asian Institute of Technology, Thailand, Publications: 50



Our research interests include food waste valorization for recovery of bioactive compounds. Prevalence of foodborne antibiotic resistance and its treatment with the novel antimicrobials from food waste. Our research interests also include food processing and preservation, development of edible packaging, extraction of bioactive compounds from underutilized plants, isolation and characterization of probiotics from local fermented foods

Dr. Syed Farhat Ali
Assistant Professor, PhD - SBS, University of Punjab, Lahore
Post Doc. LUMS-Lahore, Publications: 05



Our group is interested in production of industrially important proteins and their biochemical/enzymatic characterization. The main focus is on DNA modifying enzymes (DNA polymerase and DNA ligase – used for polymerase chain reaction and ligase chain reaction, respectively – both used for detection and diagnosis); carbohydrate metabolizing enzymes for the breakdown of plant biomass to produce simple sugars – used for food industry as well as bio-fuel production by fermentation; production of antimicrobials to explore their potential as food preservatives.

Dr. Rana Salman Anjum
Assistant Professor, PhD - University of Agriculture, Faisalabad
Post Doc. U.K., Publications: 06



We are interested in investigating the molecular basis of cancer through a specialized DNA repair mechanism which utilizes multi complex proteins for homology dependent DNA synthesis. We analyze underlying genetic mutations and study protein-protein & protein-DNA interaction. Archaea are proving to be great model organisms for simpler understanding of the complex human mechanisms. Therefore, we're employing novel and reported archaeal strains in our studies. We're also focused on understanding protein/enzymes function through phosphorylation & analyzing the role of anaphase promoting complex in cell cycle regulation.



Dr. Muhammad Mustafa
Assistant Professor, PhD - Yonsei University, South Korea.
Publications: 06

We are investigating the role of developmental proteins (e.g., HOXA10) in regulation of tumor suppressors (e.g. p53) to identify the molecular mechanisms fueling metastasis in breast cancer. The study reveals novel therapeutic targets for drug industry to fight against the leading cause of cancer deaths in Pakistan. Epigenetic silencing of tumor suppressors by chromatin remodeling proteins like CTCF is an active area to find potential locations for gene therapy in cancers. At another front we have established a functional relationship of CFTR gene with male infertility disease CBAVD and working to unveil the signaling cascades involved in disease onset. The synthetic biology subgroup is developing a PCR based molecular diagnostic tool to detect multiple distant disease related SNPs in human.

Dr. Saba Butt
Assistant Professor
PhD - University of Punjab, Lahore, Publications: 08



Our research is to investigate the effectivity of various safe plant materials for the effective control of insect pests. Our particular interest is working with various insects affecting the storage crops. Various plant materials has been identified and extracted and their insect repellent activity has been studied. The effective materials among these have been selected for further study for presence of specific compounds responsible for their repellent activity. Upcoming study plans also include finding the effectivity of these compounds on various stages of life of insects and molecular mechanisms behind the repellency.

Dr. Adnan Arshad
Assistant Professor and MPhil Program Coordinator Molecular Pathology and Genomics
PhD - University of Paris , M.B.B.S Allama Iqbal Medical College, Publications: 03



Our research team is pursuing state of the art research in normal tissue and tumor biology, radiobiology and microenvironment; tumor heterogeneity and the acquisition of aggressive properties. Moreover, our research focuses not only on the mechanisms of metastasis and formation of metastatic niches, circulating tumor cells, circulating tumor DNA, and microRNAs, but also on the dynamic and reciprocal interactions between tumor cells and associated stroma which influence the epithelial to mesenchymal transition, and confers invasive properties to cancer cells as well as the capacity to enter the stem-cell state. Our studies in these areas also include those focused on the pathology and biology of diseases utilizing in-vivo models and clinical trials.

Dr. Ibatsam Khokhar
Assistant Professor, PhD - University of Punjab, Lahore
Publications: 58



Isolation of fungal species from different substrates like soil, water, air, decayed fruits and vegetables. Culturing, purification and identification of mycoflora especially genus *Penicillium* and *Aspergillus* on morphological and molecular basis. Preservation of fungi by lyophilization. Screening of fungal species for enzyme production especially amylase and cellulase. Study the antifungal potential of different plant extracts. Study antagonistic potential among the fungal species for bio-control.

Dr. Iahtisham-ul-Haq
Assistant Professor
PhD - University of Agriculture, Faisalabad, Publications: 38



Our group broadly works in the domain of food science and nutrition. Specifically, our interests involve functional foods and nutraceuticals, model-based development and management of novel food product safety and quality, diet-gene & diet-drug interactions, novel Halal product development and dietary therapies to alleviate lifestyle related disorders. The core objectives of research interests are to unveil nutrient-specific mechanisms and exploring new horizons for food product development to support food and nutritional security.

Dr. Nazish Roy
Assistant Professor
Ph.D. Dong-A University, South Korea, Publications: 09



Our current research interests include the microbiome profiling of Cotton plant for controlling Cotton Leaf Curl disease. We are currently focused on establishing the microbiome profile using Illumina Miseq (culture independent approach) of the Cotton resistant and susceptible varieties under pathogen attack. We also intend to develop a synthetic community based on the microbiome profiles of the resistant cultivators for suppressing Cotton Leaf Curl disease.

Research products developed at KAM-School of Life Sciences

Transgenic Wheat

•Wheat with increased bio-availability of Iron & Zinc

Abid, N., Khatoon, A., Maqbool, A., Irfan, M., Bashir, A., Asif, I., ... & Malik, K. A. (2017). Transgenic expression of phytase in wheat endosperm increases bioavailability of iron and zinc in grains. *Transgenic Research*, 26(1), 109-122.

•Vitamin B6 enriched Wheat

Mohsin, S., Irfan, M., Saeed, A., Malik, K. A., & Maqbool, A. (2022). Enhanced expression of PDX1 accumulates vitamin B6 in transgenic wheat seeds. *Journal of Cereal Science*, 103502.

•Salt & Herbicide tolerant Wheat

Ijaz, S., Vivian, M., Maqbool, A., Irfan, M., Mehnaz, S., Malik, K. A., & Bashir, A. (2022). Stacking of *Hordeum vulgare* vacuolar sodium/proton antiporter and a bar gene in wheat for salt and herbicide tolerance. *Journal of Crop Science and Biotechnology*, 1-14.

•Wheat with improved nitrogen and carbon assimilation

Hasnain, A., Irfan, M., Bashir, A., Maqbool, A., & Malik, K. A. (2020). Transcription factor TaDof1 improves nitrogen and carbon assimilation under low-nitrogen conditions in wheat. *Plant Molecular Biology Reporter*, 38(3), 441-451.

•Wheat with enhanced Phosphorus use efficiency

Akhtar, A., Irfan, M., Maqbool, A., & Malik, K. A. (2022). A study of PTF1 interaction with phosphorus stress inducing genes and its influence on root architecture of transgenic Arabidopsis. *Advancements in Life Sciences*, 9(1), 60-66.



Bio-fertilizer

•PGPR (Plant Growth Promoting Rhizobacteria) for Wheat

Mukhtar, S., Shahid, I., Mehnaz, S., & Malik, K. A. (2017). Assessment of two carrier materials for phosphate solubilizing biofertilizers and their effect on growth of wheat (*Triticum aestivum* L.). *Microbiological Research*, 205, 107-117.

•PGPR (Plant Growth Promoting Rhizobacteria) for Maize

Mukhtar, S., Zareen, M., Khaliq, Z., Mehnaz, S., & Malik, K. A. (2020). Phylogenetic analysis of halophyte associated rhizobacteria and effect of halotolerant and halophilic phosphate solubilizing biofertilizers on maize growth under salinity stress conditions. *Journal of Applied Microbiology*, 128(2), 556-573.

•PGPR (Plant Growth Promoting Rhizobacteria) for Cowpea

Mukhtar, S., Hirsch, A. M., Khan, N., Malik, K. A., Humm, E. A., Pellegrini, M., ... & Mehnaz, S. (2020). Impact of soil salinity on the cowpea nodule-microbiome and the isolation of halotolerant PGPR strains to promote plant growth under salinity stress. *Phytobiomes Journal*, 4(4), 364-374.

•Zinc solubilizing bacteria for growth promotion in Wheat

Kamran S., Shahid I., Baig, D.N., Malik K.A., and Mehnaz S. (2017). Contribution of zinc solubilizing bacteria in growth promotion and zinc content of wheat. *Frontiers in Microbiology*, 8: 2593

•Zinc solubilizing fluorescent pseudomonads as biofertilizer for tomato (*Solanum lycopersicum*)

Shahid I., Tariq M., and Mehnaz S. (2020). Zinc solubilizing fluorescent pseudomonads as biofertilizer for tomato (*Solanum lycopersicum*) under controlled conditions. *Asian Journal of Plant Science and Research*, 10 (1): 1-7.

•Metabolites of *Bacillus* spp. and their application in sustainable plant growth promotion

Shahid I., Han J., Hanook S, Malik KA, Borchers CH, and Mehnaz S. (2021). Profiling of metabolites of *Bacillus* spp. and their application in sustainable plant growth promotion and biocontrol. *Frontiers in Sustainable Food Systems* <https://doi.org/10.3389/fsufs.2021.605195>

Research products developed at KAM-School of Life Sciences

Diagnostic & Prognostic Biomarkers for Multiple Sclerosis Disease

Razia, R., Majeed, F., Amin, R., Mukhtar, S., Mehmood, K., Baig, D. N. (2022). The analysis of dynamic gene expression patterns in peripheral blood of multiple sclerosis patients indicates possible diagnostic and prognostic biomarkers. *Molecular Immunology*, 147–156.

Glioma formalin fixed-paraffin embedded archives

Gul, S., Ayoub, A., Hanook, S., Mehdi, A., Syed, A. A., Baig, D.N. (2021). Profilin 3 genetic architecture in Glioma formalin fixed-paraffin embedded archives. *Gene*, 787, 145614.

Epilepsy Diagnostics

Al-Bradie, R., Baig, D.N., Bashir, S. (2021). Sodium voltage gated channel alpha subunit 9 mutation in epilepsy. *European Review for Medical and Pharmacological Sciences* 25:7873-7877.

Brain-specific transcriptomic expression of Ezr, Rad and Msn genes

Ali, S. A., Baig, D. N. (2018). Deciphering brain-specific transcriptomic expression of Ezr, Rad and Msn genes in the development of *Mus musculus*. *International Journal of Developmental Neuroscience* 68: 106-110.

Mus musculus brain tissues

Fateen, A., Ali, S. A., Baig, D.N., Basharat, Z. (2018). Profilin (*pfn*) isoforms transcriptional and bioinformatics exploration and Mus musculus brain tissues development. *Gene Reports* 10: 177-183.

Autism Spectrum disorder diagnostics

Baig, D.N., Yanagawa, T., Tabuchi, K. (2017). Distortion of the normal function of synaptic cell adhesion molecules by genetic variants as a risk for Autism Spectrum Disorders. *Brain Research Bulletin* 129:82-90.

Edible Meat Packaging Material

Khan, M. R., Sadiq, M. B., & Mehmood, Z. (2020). Development of edible gelatin composite films enriched with polyphenol loaded nanoemulsions as chicken meat packaging material. *CyTA-Journal of Food*, 18(1), 137-146.

Gelatin nano-composite films for shelf-life extension

Mehmood, Z., Sadiq, M. B., & Khan, M. R. (2020). Gelatin nanocomposite films incorporated with magnetic iron oxide nanoparticles for shelf life extension of grapes. *Journal of Food Safety*, 40(4), e12814.

Chitosan and Sweet Orange (*Citrus Sinensis*) Peel essential oil based coating

Sheikh, M., Mehnaz, S., & Sadiq, M. B. (2021). Prevalence of fungi in fresh tomatoes and their control by chitosan and sweet orange (*Citrus sinensis*) peel essential oil coating. *Journal of the Science of Food and Agriculture*, 101(15), 6248-6257.

Chicken feet gelatin based packaging paper

Fatima, S., Mir, M. I., Khan, M. R., Sayyed, R. Z., Mehnaz, S., Abbas, S., Sadiq, M. B., & Masih, R. (2022). The optimization of gelatin extraction from Chicken feet and the development of gelatin based active packaging for the shelf life extension of fresh grapes. *Sustainability*, 14-7881.

Modified Corn starch for different bakery products

Publication is under process.



Ongoing research projects - KAM-SLS

1. Dr. Samina Mehnaz (PI): "Environmentally safe polyhydroxybutyrate (PHB) based biodegradable packaging film as an alternative to conventional plastic."; funded by HEC; cost: 8 million Pak Rupees; duration: 2022-2025.
2. Dr. Muhammad Irfan (PI): "Enhancement of Omega-3 fatty acids in maize."; funded by HEC; cost: 4.5 million Pak Rupees; duration: 2022-2025.
3. Dr. Muhammad Imran (PI): "Isolation, identification and characterization of novel microbial s-triazine and dicamba degrading proteins."; funded by HEC; cost: 4.3 million Pak Rupees; duration: 2022-2025.
4. Dr. Syed Farhat Ali (PI): "Production enhancement and PCR application of an archaeal DNA polymerase - an important diagnostic enzyme."; funded by HEC; cost: 6.8 million Pak Rupees; duration: 2022-2025.
5. Dr. Muhammad Irfan (PI): "Development of climate smart cotton by editing Arginase (GhArg) genes using genome editing (CRISPR/Cas) tools."; funded by LCF-HEDP; cost: 21 million Pak Rupees; 2022-2024.
6. Dr. Nazish Roy (PI): "In silico analysis of interactions between viral genes of begomovirus and R-Genes of Gossypium species."; funded by FCCU; cost: 0.2 million Pak Rupees; duration: 12 months.
7. Dr. Kauser A. Malik (PI): "Microbiome profiling of the Cotton Plant under Cotton Leaf curl disease attack."; funded by AVH & Pakistan Academy of Sciences; cost: 6.3 million Pak Rupees; duration: 2020-2023.
8. Dr. Zubair Yousaf (PI): "Development & Evaluation of Lab scale Integrated Biotech refinery to convert poultry wastes into industrially important, safe & useful products."; funded by HEC; cost: 4.3 million Pak Rupees.
9. Dr. Muhammad Arslan (PI): "Oxidative stress in severely obese children and its impact of metabolic dysfunction."; funded by Pakistan Academy of Sciences; cost: 2.8 million Pak Rupees; duration: 2021 - 2023.



Conferences and workshops organized by KAM-SLS

1. National Dialogue on Agricultural biotechnology for Food security and Capacity building of Biosafety regulators on 11-12 December, 2019 at COMSTECH, Islamabad.
2. International Conference on Microbes for Sustainable Agriculture from 25-28 March, 2019 at FCCU, Lahore.
3. A two day workshop on Plant Biotechnology for Food Security from November 27-28, 2018 at FCCU, Lahore.
4. 2nd international biotechnology advisory committee meeting of ISESCO at FCC, on February 27-28, 2017.
5. 1st Iran-Pakistan international training workshop on "Probiotics: Research to Production" at FCC, from March 27 - 29, 2017.
6. 2nd international workshop on X-ray Crystallography at FCC from October 15-19, 2016.
7. Hosted workshop on "Preparing Biological Laboratories for ISO35001(CWA 15793) Laboratory Biorisk Management" from July 17-19, 2016.
8. International workshop on "Genomics and Genome Editing" at FCC, from May 24-27, 2016.
9. International conference on food security and nutrition" at FCC, from November 5-7, 2015.
10. One day conference on "Status of the progress of Wheat Biotechnology in Pakistan" at FCC, on October 2, 2015.

Other Research Activities:

1. More than 24 research seminars by invited speakers.
2. Faculty members and PhD students have presented their work nationally and internationally in USA, Belgium, Iran, Taiwan, Oman, Jordan, Thailand, Spain, Germany and Indonesia.
3. Department started two new MPhil programs in evening since 2014.
4. More than 50 BS and 60 MPhil students have completed their research.
5. Currently 20 PhD students are enrolled, among these three are fully funded by HEC and rest of them are funded through our research projects.
6. PhD students have been in USA, Germany, Netherlands and Canada, availing IRSIP fellowship.



KAM-SLS has signed MOUs with the following organizations

- Syed Babar Ali School of Science and Engineering (SBASSE) (LUMS)
- Pakistan Council of Scientific Industrial Research (PCSIR)
- World Wildlife Fund (WWF)
- Punjab Agricultural Research Board (PARB)
- Lahore Chamber of Commerce and Industry(LCCI)
- BF Biosciences Ltd
- Four Brothers Group Pakistan (4B)
- Corteva Agrisciences
- Croplife Pakistan Association
- Waste Busters Lahore
- Chughtai Lab Lahore
- Allama Iqbal Medical College (AIMC)/Jinnah Hospital
- PLAN 9



Four Brothers Group (4B) Pakistan



Punjab Agricultural Research Board (PARB)



Pioneer Pakistan Seeds Ltd (Crop Life)



Allama Iqbal Medical College (AIMC)/Jinnah Hospital

School of Life Sciences named after Dr. Kauser Abdulla Malik HI, SI, TI, in March 2020.



Handing over of the transgenic biofortified wheat seeds to Director, Wheat Research Institute, in presence of secretary agriculture, Punjab and CE, PARB

Research Facilities at KAM-SLS



Soil Preparation Room



Climate Control Room



Fluorescent Microscopy Room



Genetics Lab



Mycology Lab



Molecular Biology Lab



Experimental Field Area



Green House



Microbial Metabolites Lab



Molecular Diagnostic Lab



Cell Culture Lab



Tissue Culture Lab

KAM-SLS Proud PhD Alumni



Dr. Salma Mukhtar
1st PhD of FCCU
Postdoctoral Fellowship USA
PhD Biotechnology (2018)



Dr. Ammarah Hasnain
Vice Principal
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