

CURRICULUM VITAE

Dr. Fazal Akbar

Director/ Associate Professor (Tenured)
Center for Biotechnology and Microbiology,
University of Swat, Pakistan.



Personal Information

Postal Address: Center for Biotechnology and
Microbiology, University of Swat, Academic Block C,
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Qualifications

Doctor of Philosophy (PhD): Biotechnology/Molecular Plant Virology

1. PhD research conducted at Institute of Botany, University of Basel, Switzerland.

Research Title: Transcript analysis of *Cotton leaf curl Burewala virus* and role of C2 in pathogenesis

National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, an affiliated institute of
Pakistan Institute of Engineering and Applied Sciences (PIEAS), Islamabad, Pakistan.

CGPA: 3.93/4

2. **Post doctorate:** Molecular Plant Virology lab, NIBGE, Faisalabad Pakistan (2012-2013).

AWARDS, SCHOLARSHIPS & DISTINCTIONS

- Awarded Research Productivity Award 2017 by Pakistan Council of Science and Technology (PCST).
- Awarded Best University Teacher Award 2016 by Higher Education Commission (HEC) of Pakistan.
- Productive scientist of Pakistan for the year 2016 and year 2017 issued by Pakistan Council of Science and Technology (PCST).
- Awarded the 1st prize in Regional Science Olympiad/ Fair organized by Directorate of Science & Technology (DoST), Government of Khyber Pakhtunkhwa.
- Award of Excellence in Research by University of Swat.
- Awarded the status of HEC approved PhD Supervisor in the discipline of Biological Sciences.
- Awarded 6 months' fellowship (January 2011-July 2011) for Switzerland under International research support initiative program (IRSIP) by Higher Education Commission of Pakistan.
- Awarded Indigenous PhD fellowship (2008-2012) by Higher Education Commission of Pakistan.
- Throughout First Division in the academic career.

RESUME OF WORKING EXPERIENCE

- Currently working as Associate Professor (Tenured) in Center for Biotechnology and Microbiology, University of Swat (from April 12, 2021 till date).
- Worked as Assistant Professor in Center for Biotechnology and Microbiology, University of Swat (from July 2013 till April 11, 2021).
- Engaged as a Visiting Professor in Institute of Cotton Research of Chinese Academy of Agriculture Sciences (CAAS), China from July 17, 2019 till October 22, 2019.
- Worked as a Researcher (Post-doc) in a project entitled “Pak-US Cotton Productivity Enhancement Project” Analysis of the diversity of cotton leaf curl begomovirus complex and its whitefly vector in Pakistan- Component, funded by the United States Department of Agriculture (USDA), managed by the International Center for Agricultural Research in the Dry Areas (ICARDA, Islamabad office) (from May, 2012 to April, 2013) at National Institute for Biotechnology and Genetic Engineering, Faisalabad/Principal investigator (PI) of the project, Prof. Dr. Rob W. Briddon.
- Six months training experience in Institute of Botany, University of Basel, Switzerland (from January, 2011 to July, 2011).
- Worked as a Lecturer in Govt. Degree College Daggar, District Buner (from August, 2007 to September, 2008).
- Worked as a PhD Scholar in HEC funded project (from 2008 to 2012) at National Institute for Biotechnology and Genetic Engineering, Faisalabad/Principal investigator (PI) of the project, Dr. Muhammad Saeed (Principal Scientist).
- Worked as a Coordinator for M. Phil/ PhD Program, Center for Biotechnology and Microbiology University of Swat (from 2015 to 2019).

Projects awarded:

PI:

- Analysis of the diversity of begomovirus-complex and its whitefly vector in Khyber Pakhtunkhwa (funded by Higher Education Commission Pakistan, worth 4.7 million).
- Analysis of a unidirectional plant promoter from cotton associated begomoviruses (funded by Higher Education Commission Pakistan, worth 2.3 million).
- Investigation of resistance breakdown of cotton leaf curl disease (funded by Pakistan Science Foundation, worth 3.0 million).
- Exploration of geminiviruses and satellites in Swat valley (funded by Higher Education Commission Pakistan, worth 0.5 million).
- “Evaluation of antibodies response in COVID-19 recovered patients for its use in plasma therapy (Small research grant funded by University of Swat).

Co-PI:

- Designing biological control strategies against peach leaf curl disease (funded by Higher Education Commission Pakistan, worth 2.9 million).
- Molecular characterization and prevalence of hepatitis C virus infection in mentally disabled persons in District Swat (funded by Higher Education Commission Pakistan, worth 0.5 million).
- Demographic and phylogenetic analysis of *Helicoverpa armigera* pyrethroids resistant strain in Pakistan (funded by Higher Education Commission Pakistan, worth 0.5 million).
- Degraded DNA studies through non codis STRs (funded by Higher Education Commission Pakistan, worth 0.5 million).

Collaborating Research Projects:

- A collaborator with Professor Liu Chuan Liang, State Key Laboratory of Cotton Biology, Institute of Cotton Research of CAAS, China in a research project entitled “Investigating the virus carrying whitefly vector in the Yellow River Basin, China” submitted to Asian Regional International Cooperation Special Project program.
- A collaborator with Dr. Ishtiaq Hassan, Department of Biotechnology and Genetic Engineering, Hazara University Mansehra, in a research project entitled “Population dynamics of begomovirus complex and its insect vector in vegetable crops of Khyber Pakhtunkhwa” funded by HEC under NRPU program.

Committee membership:

- Member of Advance Studies and Research Board (ASRB), University of Swat, Pakistan.
- Member of Graduate Studies Committee, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Member Board of Faculties for Life Sciences, University of Swat, Pakistan.
- Member Board of Studies, Department of Biological Sciences, Women University, Mardan, Pakistan.
- Member Board of Studies, Center for Animal Sciences and Fisheries, University of Swat, Pakistan.
- Member Board of Studies, Department of Forensic Sciences, University of Swat, Pakistan.
- Member Board of Studies, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Member of Departmental Semester Committee, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Member of Departmental Semester Committee, Department of Forensic Sciences, University of Swat, Pakistan.
- Focal person of the program team (PT), Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Focal person for Prime Minister National Laptop Scheme, Higher Education Commission, Islamabad Pakistan.
- Seminar Organizer, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Member of the Assessment team (AT) for Department of Animal Sciences and Fisheries, University of Swat, Pakistan.

- Focal person of Admission Committee, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Focal person of the Departmental Semester coordinators for the selection of visiting faculty, Center for Biotechnology and Microbiology, University of Swat, Pakistan.
- Member of the Committee on Research, University of Swat, Pakistan.
- Member of committee for Research projects implementation & SOPs, University of Swat, Pakistan.
- Member of Strategic Plan Committee, University of Swat, Pakistan.
- Member of Departmental Tenure Review Committee (DTRC) for the Department of Forensic Sciences, University of Swat.
- Member of DTRC for the Institute of Chemical Sciences, University of Swat.
- Member of DTRC for the Institute of Agriculture Sciences and Forestry, University of Swat.
- Member of Ethical Institutional Review Board, University of Swat.

TEACHING ACTIVITIES

- Offering various courses of Biotechnology & Microbiology to M. Phil and Ph. D. Scholars since last ten years.
- Teaching various courses of Biotechnology, Genetics, and Microbiology to Bachelor and Master level students at Centre for Biotechnology and Microbiology, University of Swat since last ten years.

CONFERENCES, WORKSHOPS and SEMINARS Participated

- Presented a research paper in 1st National Symposium on “Recent advances in Biotechnology” University of Malakand, May 21-24, 2007.
- Participated in a conference on “micro RNA by Professor Dr. David Baulcombe from USA” in University of Basel, Switzerland, June 2011.
- Presented a PhD research seminar at NIBGE, Faisalabad, May 2012.
- Presented a research paper in “International conference on Biotechnology: Prospects and Challenges in Agriculture, Industry, Health & Environment” at NIBGE, Faisalabad, April 22-26, 2013.
- Participated in a workshop on "Scientific Writing" 20 and 21 October 2015, organized by Hassan Ibrahim Jamal (HEJ) Institute Karachi.
- Participated in talk session by Professor Dr. Atta-Ur-Rehman on "Building a knowledge economy: Imperative for socio-economic development" organized by HEC, Pakistan dated September 2, 2015.
- Delivered a talk on the scope of Biotechnology at Govt. Degree College Daggar, Buner dated November 17, 2015.
- Participated in a workshop on writing effective post-doctoral research proposal relevant to national needs on December 17, 2015 at University of Malakand, Chakdara.
- Participated in a seminar on Cancer prevention and treatment dated February 4, 2016 at SINOR, Saidu Sharif Swat.

- Presented a poster on “Phylogenetic and biogeographic analyses of *Cotton leaf curl Kokhran virus-Burewala*” in the International conference on advancement in Biotechnology organized by Government college women university Faisalabad and Akhuwat-FIRST on March 30 to 31, 2016.
- Participated in a conference on "7th one-day conference on the significance of Bioinformatics in Biosciences" at the Department of Bioinformatics and Biosciences, Capital University of Science and Technology, Islamabad.
- Presented a research paper on “First symptomatic evidences of geminivirus in Swat valley" in 13th National conference on weed sciences, dated August 19-21, 2016, at Shaheed Benazir Bhatto University, Sheringal Dir upper, KP, Pakistan.
- Participated in National Symposium on economic development through medicinal plants and conservation cultivation, dated May 5-6, 2016, organized by Center for Plant Sciences and Biodiversity, University of Swat, Pakistan.
- Participated in 5 days training workshop on Biorisk management, dated September 5-9, 2016, organized by Relief International (RI) at Center for Biotechnology and Microbiology, University of Swat.
- Participated in one-day workshop on Leadership, Motivation and Rule of law, dated October 21, 2016, organized by Center for Animal Sciences and Fisheries and Department of Forensic Sciences, University of Swat.
- Participated in one-day workshop on “Quality Assurance through promoting Anti-plagiarism culture" dated January 5, 2017 organized by Quality Enhancement Cell, University of Swat.
- Participated in one-day seminar on “Self-assessment report writing" dated March 9, 2017 organized by Quality Enhancement Cell, University of Swat.
- Presented a research paper on “Bibliometric analysis of worldwide publications on Cotton leaf curl disease research" in Conference on Computational Biology and Genomics, dated September 27-29, 2017 at Hazara University Masehra, KP, Pakistan.
- Presented a research paper on “Transcript mapping of cotton associated begomoviruses" in Conference on Computational Biology and Genomics, dated September 27-29, 2017 at Hazara University Masehra, KP, Pakistan.
- Performed as Ambassador/ participant in Innovative Youth Awards 2017 held on December 30, 2017 at Wadoodia Hall, Swat.
- Participated in one-day workshop on “Anti-plagiarism and use of Turnitin" dated April 11, 2018 organized by the Quality Enhancement Cell, University of Swat.
- Participated in one-day seminar on “Writing a winning grant proposal and scholarship application" dated July 3, 2018 organized by the Department of Forensic Sciences, University of Swat.
- Participated in three days training workshop on “Research Methodology" dated August 8-10, 2018 at PTCL Campus, University of Swat, jointly organized by Learning Innovation Division (LID), HEC, and Quality Enhancement Cell (QEC). University of Swat.
- Presented a research paper on “Investigation of plants single stranded DNA viruses infecting medicinal and aromatic plants in Swat valley" in 2nd International conference on Conservation of Medicinal and Aromatic Plants (MAPs) for Improving the Livelihood of Mountain Communities through Industrial

Linkages, dated September 3-5, 2018, organized by Center for Plant Sciences, University of Swat, KP, Pakistan.

- Presented a research paper on “Biosynthesis of Iron oxide nanoparticles via *Skimmia laureola* and their antimicrobial efficiency against bacterial rot pathogen *Erwinina carotavora*” in 2nd International conference on Conservation of Medicinal and Aromatic Plants (MAPs) for Improving the Livelihood of Mountain Communities through Industrial Linkages, dated September 3-5, 2018, organized by Center for Plant Sciences, University of Swat, KP, Pakistan.
- Participated in one day hands on training workshop “Principles of Biosafety and Biosecurity” at Department of Zoology, University of Buner, dated October 23, 2018, organized by Department of Zoology, University of Buner in collaboration with Pakistan Biological Safety Association (PBSA) & Fogarty International Center, NIH USA.
- Participated in 1st National Workshop on Molecular Biology: Tools & Techniques, dated November 12-14, 2018, organized by Department of Botany, University of Malakand, KP, Pakistan.
- Presented a research paper on “The threat of begomovirus and satellites is spreading into Khyber Pakhtunkhwa” in 1st National conference on Microbiology of Infectious diseases and health safety ” dated April 4-5, 2019, organized by Department of Microbiology, University of Sawabi, KP, Pakistan.
- Presented a research paper and awarded a best oral presenter award on “Isolation, identification and molecular characterization of causative agent of peach leaf curl disease in Swat” in 1st National conference on Microbiology of Infectious diseases and health safety” dated April 4-5, 2019, organized by Department of Microbiology, University of Sawabi, KP, Pakistan.
- Participated in International Workshop on “Use of Genome Editing & other New Breeding Technologies for Global Food Security” jointly organized by ICGEB, COMSTECH and NIBGE on April 8-10, 2019, COMSTECH Islamabad, Pakistan.
- Presented a research paper on “Molecular characterization of begomovirus and associated satellites infecting important crops in Khyber Pakhtunkhwa, Pakistan” in “3rd International Conference; Empowering nation through sciences” held on 24th -25th April, 2019, Islamabad, Pakistan.
- Participated in one-day seminar on “O-GlcNAcylation in cervical cancer metastasis in cell death” held on April 26, 2019, organized by Institute of Chemical Sciences, University of Swat.
- Presented a paper on “Exploration of begomoviruses and their associated satellites infecting different crops in Buner region” in 1st International Conference on Recent Updates in Biotechnology 2019, held on October 16, 2019, organized by Department of Biotechnology, AWKUM, Mardan.
- Presented a research paper on “Isolation and molecular characterization of *Naganishia species* associated with peach leaf curl disease in District Swat, Pakistan” region” in 1st International Conference on Recent Updates in Biotechnology 2019, held on October 16, 2019, organized by Department of Biotechnology, AWKUM, Mardan.
- Presented a research paper on “Evaluation of antifungal activities of *Tribulus terrestris* and *Glycyrrhiza glabra* plant extracts against *Taphrina* species of peach leaf curl disease” region” in 1st International Conference on Recent Updates in Biotechnology 2019, held on October 16, 2019, organized by Department of Biotechnology, AWKUM, Mardan.

- Presented a research paper on “Diversity of fishes in the tributaries of River Swat” in 1st International Conference on Recent Updates in Biotechnology 2019, held on October 16, 2019, organized by Department of Biotechnology, AWKUM, Mardan.
- Participated in three days conference “The 40th anniversary of the cotton branch of the Chinese agricultural society and 2019 annual meeting” held on August 7-9, 2019 organized by China National University of Development and China Cotton Society of Chinese Academy of Agriculture Sciences at Friendship hotel, Beijing China.
- Invited as a speaker on the topic “Plant viruses with special emphasis on the Status of Cotton leaf curl disease in Pakistan” dated September 19, 2019 at Institute of Cotton Research of CAAS, Anyang, China.
- Presented a research paper on the topic “First report of the phytopathogens associated with peach leaf curl disease in Pakistan” in National Conference on Beneficial Microbes & Sustainable Crop Production, dated 19th to 20th February, 2020, organized by Department of Agronomy, The University of Agriculture Peshawar and American Society for Microbiology.
- Invited as a speaker on the topic “Status of peach leaf curl disease in Pakistan” dated September 10, 2019 at Zhengzhou Fruit Research Institute (ZFRI), CAAS, P.R. China.
- Participated in the KP CREATIVE FEST 2020, organized by Directorate of Science & Technology (DoST), held at Islamia College Peshawar on 26-27 February, 2020.
- Participated in three day Awareness and training workshop on Crimean-Congo Hemorrhagic Fever (CCHF) virus, organized by the Health Security Partners, USA, and Department of Biotechnology, University of Malakand, held on December 22-24, 2020.
- Participated in five-day virtual training on Biorisk Arrangement organized by Association for Biorisk Management (ABM) Training, in collaboration with Health Security Partners (HSP) at Biotechnology laboratory, University of Swat, dated May 31 to June 4, 2021.
- Participated in two-days Biorisk Management refresher training course, organized by ABM, in collaboration with HSP and University of Swat at Microbiology lab, University of Swat, dated December 30 to 31, 2021.
- Presented a research paper on the topic “Plant Viruses: A serious threat to food security in Khyber Pakhtunkhwa” in International Conference on Food Security Though Sustainable Plant Protection Strategies, dated 16th to 20th January, 2022, organized by Department of Plant Protection, The University of Agriculture Peshawar.
- Presented a research paper on the topic “Genetic diversity of begomovirus-complex and its whitefly vector in Khyber Pakhtunkhwa” in First International Conference on Biotechnology, BIOCON-‘2022, dated March 16-17, 2022 organized by Department of Biotechnology, University of Karachi, Pakistan.
- Presented a research paper on the topic “Analysis of the genetic diversity of begomovirus-complex and its whitefly (*Bemisia tabaci*) vector in Swat” in Fifth International Conference on Advances in Biosciences, Bridging the gap between research and sustainable development goals, dated May 24-26, 2022, organized by Center for Plant Sciences & Biodiversity, University of Swat.
- Presented a research paper on the topic “Comparative performance of exotic cotton varieties under the climatic conditions of Swat” in Fifth International Conference on Advances in Biosciences, Bridging

the gap between research and sustainable development goals, dated May 24-26, 2022, organized by Center for Plant Sciences & Biodiversity, University of Swat.

- Participated in three days Kazakhstan-Pakistan-Turkiye; Youth Forum on Biotechnology, dated 13th September to 15th September, 2022, jointly organized by COMSTECH, IOFS, and ICYF, at COMSTECH, Islamabad.
- Presented a research paper on the topic “Immunoinformatics-based design of immune-boosting multi-epitope subunit vaccines against monkeypox virus and validation through molecular dynamics and immune simulation” in three days’ International Conference on the topic “Endemic and Pandemic preparedness” dated December 5-7, 2022, at Pakistan Academy of Sciences (PAS), Islamabad, and Alliance of International Science Organization (ANSO).
- Participated in three days’ International Conference on the topic “Endemic and Pandemic preparedness” dated December 5-7, 2022, at Pakistan Academy of Sciences (PAS), Islamabad, and Alliance of International Science Organization (ANSO).

Workshops/ Conferences/ Seminars organized:

- Organized five days International Conference on Food Security Through Sustainable Plant Protection Strategies, dated 16th to 20th January, 2022, organized by Department of Plant Protection, The University of Agriculture Peshawar.
- Organized two days Collaborative Workshop and Debates on Rule of law, diversity, tolerance, and leadership on August 11-12, 2021 in collaboration with Centre for Research and Security Studies (CRSS), Islamabad, and Department of Forensic Sciences, University of Swat, Pakistan.
- Organized 4-day virtual training program on “Strategies to develop chemical and biological safety culture in medical laboratories” on February 5-8th 2021, organized by Centre for Biotechnology and Microbiology, University of Swat in collaboration with Health Security Partners USA.
- Organized one-day student’s seminar and poster exhibition on February 18, 2021 at PTC Hall, University of Swat in collaboration with Department of Forensic Sciences, University of Swat.
- Organized one-day seminar entitled “Coronavirus infection: Awareness Seminar on Prevention and Control” held on March 3, 2020 at Swat Regency Hotel.
- Organized one-day seminar entitled “Genome Re-sequencing: Technology & Applications” on October 16, 2018 at the PTCL hall, University of Swat.
- Organized one-day seminar entitled “Studies on advanced materials” held on December 28, 2018 at the PTCL hall, University of Swat.
- Organized an awareness seminar entitled “Prevention and control of mosquito-borne diseases” on April 25, 2018 at the PTCL hall, University of Swat.
- Organized one-day workshop entitled “Biosafety and Biosecurity for Scientists” on November 14, 2017 at the PTCL hall, University of Swat.
- Organized one-day seminar entitled “Biotechnology Driven Socio-economic Development” on September 3, 2015 at the Video Conference Room, Main Campus Odigram.

Membership of Scientific Societies

- Life member Biotechnology Society of Pakistan
 - Ambassador of Innovative Youth Forum
- Member of International Society for Development and Sustainability, Japan.
 - Member of Asian Council of Science Editors, Dabai, UAE.

Editor/ Reviewer (Journals)

- Bioengineering and Biosciences, Horizon Research Publishing, USA.
- Journal of Advances in Microbiology and Biotechnology (JAMB), UAE.
- Trends in Clinical Microbiology, Gratis Open Access Publishers, USA.
- Cellular and Molecular Biology, CMB-ASSOCIATION 34, Boulevard Solferino 86000 POLITIERS France.
 - Pakistan Journal of Zoology, Pakistan.
- The International Journal of Global Sciences, Pakistan.
- American Journal of Biochemistry and Molecular Biology.
 - Biotechnology.
 - International Journal of Virology.
 - Singapore Journal of Scientific Research.
 - Asian Journal of Biotechnology.
 - International Journal of Tropical Insect Science.
 - Journal of King Saud University - Science*
 - Australasian Plant Pathology
 - Sains Malaysiana
 - Asian Plant Research Journal
 - 3 Biotech
- International Journal of Agriculture and Biology (IJAB)
 - National Journal of Biological Sciences (NJBS)
 - BMC Plant Biology
 - Acta Biologica, Poland
 - Journal of Bimolecular Structure & Dynamics
 - Physiologia Plantarum, UK

Publications

- Faisal, S., Khan, S., Abdullah, Zafar, S., Rizwan, M., Ali, M., Ullah, R., Ghadeer, M., Albadrani, Hanan, R., **Akbar, F.**, (2022). Fagonia cretica mediated synthesis of manganese oxide (MnO₂) nanomaterials and evaluation of its bio catalytic and enzyme inhibition potential for maintaining flavor and texture in apple. Catalysts. 12 (5), 558 ; <https://doi.org/10.3390/catal12050558>

- Suleman, M., Arshad, U., Shafia, Akbar, F., Khan, H., Hussain, Z., Ali, SS., Mohammad, A., Ali, L., Khan, A., Wei, D. (2022). Screening of immune epitope in the proteome of the Dabie bandavirus, SFTS, to design a protein-specific and proteome-wide vaccine for immune response instigation using an immunoinformatics approaches. *Computers in Biology and Medicine*. 148, 105893.
- Neelab, Ullah S, Faiz, P., Rashid, S., Rahim, K., **Akbar, F.**, *Yousafzai*, MT., Lashari, AH., Rashid, W., Hussain, Z. (2022). Effects of Marble Industry Effluents on Soil Quality, Growth and Productivity of Tomato (*Lycopersicon esculentum*) in District Swat, Khyber Pakhtunkhwa, Pakistan. *Polish Journal of Environmental Studies*. 31 (4), 1-8.
- Subhanuddin, Khan, NU., Rahat, MA., Ahmad, A, **Akbar, F.**, Ullah, N., Shah, M., Rasool, A., Israr, M. (2022). Sibling and non-sibling fingerprints comparison of Pakhtun population of Swat, KP, Pakistan. *Advancements in Life Sciences*. 9 (1): 85-91.
- Khan, M., **Akbar, F.**, Abdullah, Shah, SH. (2022). Frequency distribution of most common infectious diseases among the hospital visited patients of Peshawar, Khyber Pakhtunkhwa, Pakistan. *Life Science Journal of Pakistan*. 4(1): 3-7.
- Hussain I., Mehmood SA., Shah M., Salim M., Sanaullah., Usman K., Saeed N., Israr M., **Akbar F.**, Rasool A., Khan W., and Jabeen H., (2022). Systematic analysis of Leisler's bat *Nyctalus leisleri* (Kuhl, 1817) captured from FATA region, Pakistan. *Brazilian Journal of Biology*. 82, 2022. e238337 <https://doi.org/10.1590/1519-6984.238337>.
- Ullah N., Ullah I., Shah M., Israr M., Rasool A., **Akbar F.**, Ahmad MS., Ahmad S et al. (2022). Comparative brain analysis of wild and hatchery reared Mahseer (*Tor putitora*) relative to their body weight and length. *Brazilian Journal of Biology*. 82, 2022. e231509. <https://doi.org/10.1590/1519-6984.231509>.
- Shah M., Kausar, S., Mian, JA., Jabeen, H., Ullah, N., Rasool, A, **Akbar, F.**, Israr, M., Mehmood, SA., Ahmad, S., Khan, MAA. et al. (2022). Bioaccumulation of heavy metals in the tissues of *Schizothorax plagiostomus* at River, Swat. *Brazilian Journal of Biology*. e243633. <https://doi.org/10.1590/1519-6984.243633>.
- Rahat, MA., Israr, M., Hassan, I., Islam, M., Ali, A., Khan, MI., Jabeen, H., Rasool, A., Akbar, F. et al. (2022). Episode of Hepatitis C viral infection in the people of Swat, Pakistan. *Brazilian Journal of Biology*. 82, e243283 | <https://doi.org/10.1590/1519-6984.243283>
- Ullah, N.; Said, A.; Israr, M.; Rasool, A.; Akbar, F.; Ahmad, S.; Mehmood, S. A.; Jabeen, H.; Islam, M.; Muhammad, S.; Noureenh, S.; Habiba, Ume; Ahmed, D.; Shah, M.; Khan, M. A. A.; Siraj, M. (2022). Effect of different protein based feed on the growth of mahseer. *Brazilian Journal of Biology*. 82, e243670. <https://doi.org/10.1590/1519-6984.243670>.
- Shah M., Luqman., Saeed K., Ahmad MS., Mehmood SA., Ahmad S., Alam A., **Akbar F.**, Rasool A., Israr M., Khan W., and Jabeen H., (2022). Biodiversity of Orb-web spiders (Family: Araneidae) in District Buner, Pakistan. *Brazilian Journal of Biology*. 82. e238339. <https://doi.org/10.1590/1519-6984.238339>
- Ullah I., Afridi SG., Khan AS., Israr M., Ali A., Shah M., Shams S., Jabeen H., Rasool A., **Akbar F** et al. (2022). PCR-RFLP based genetic diversity of plasmodium vivax genotypes in District Mardan, Pakistan. *Brazilian Journal of Biology*. 82. <https://doi.org/10.1590/1519-6984.241110>

- Khan, Z., Zaman, N., Iqbal, S., Khan, A., Ualiyeva, D., Mahmood, RT., Rahim, G., **Akbar, F.**, Mian, IA. (2022). Incidence of Hepatitis C virus infection in Swat District, Pakistan: a preliminary study. *Pure and Applied Biology*. 11, 51-57. <http://dx.doi.org/10.19045/bspab.2022.110006>.
- **Akbar, F.**, Suleman, M., Israr, M., Ali, SS., Zaman, N., Khan, O., Ali, J., Ahmad, W. et al. (2022). Effect of temperature and humidity on coronavirus infection in Pakistan. *Gene Reports*. 26 (2022) 101441. <http://doi.org/10.1016/j.genrep.2021.101441>.
- Naeem, M., Ullah, F., Zahid, M., Kousar, K., **Akbar, F.**, Khan, ZU. 2022. A Preliminary Study to find the Pattern of Infectious Diseases in Buner. *Pakistan Journal of Medical & Health Sciences*. 16 (9), 271-273.
- Suleman, M., Qamar, MTU., Saleem S., Ahmad, S., Ali, SS., Khan, H., **Akbar, F.**, Khan W., Alblihy, A., Alrumaihi, F., Waseem, M., Allemailem, KS. (2021). Mutational Landscape of Pirin and Elucidation of the Impact of Most Detrimental Missense Variants That Accelerate the Breast Cancer Pathways: A Computational Modelling Study. *Front. Mol. Biosci*. 8:692835. doi:10.3389/fmolb.2021.692835.
- Asadullah., Din, AU., Ghafoor, SU., **Akbar, F.**, Akhtar, N., Khan, MF., Ullah, Z., Kareem, A. (2021). Analysis of mutations in leu tRNA gene in patients of heart diseases, *Saudi Journal of Biological Sciences*, <https://doi.org/10.1016/j.sjbs.2021.09.010>.
- Murshed, SAA., Rizwan, M., **Akbar, F.**, Zaman, N., Suleman, M., Ali, SS. (2021). Analysis of the Aflatoxin M1 contamination in traditional and commercial cheeses consumed in Yemen. *International Journal of Dairy Technology*. doi: 10.1111/1471-0307.12827.
- Ahmad SI, Nasar Z, Ullah Z, Akhtar N, **Akbar F**, Ahmad N (2021). Characterization and quantification of betasatellites research from Google Scholar using a bibliometric approach. *Advancements in Life Sciences*. 8(4): 360-367.
- Ahmad, I., Ahmad, S., Khan, W., Lal, A., Akbar, F., Ali, M. (2021). Correlation between hepatitis B e antigen and hepatitis B virus DNA in HBV infected carrier. *Journal of Saidu Medical Collage Swat*. 11 (4), 196-199.
- Fazal, H., Abbasi, BH., Ahmad, N., Noureen, B., Shah, J., Ma, D., Chuanliang, L., **Akbar, F.**, Uddin, MN., Khan, K., Ali, M. 2020. Biosynthesis of antioxidative enzymes and polyphenolics content in calli cultures of *Prunella vulgaris* L. in response to auxins and cytokinins. *Artificial Cells, Nanomedicine, and Biotechnology*, 48:1, 893-902, DOI: 10.1080/21691401.2020.1771349
- Gul H., Ali SS., Saleem S., Khan S., Khan J., Wadood A., Rehman 82, 2020. AU., Ullah Z., Ali S., Khan H., Hussain Z., **Akbar F.**, Khan A., Wei D. (2020). Subtractive proteomics and immunoinformatics approaches to explore *Bartonella bacilliformis* proteome (virulence factors) to design B and T cell multi-epitope subunit vaccine. *Infection, Genetics and Evolution*. 85, 104551.
- Shah, A., Ayub, A., Shuja, MN., Ali, T., **Akbar, F.** 2020. Molecular characterization of the begomovirus associated satellites infecting *Spinacia oleracea* and *Capsicum annum* plants in Kohat, Pakistan. *BioScientific Review (BSR)*. 2 (4), 2663-420, 43–56.
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Publications accepted:

1. **Akbar, F.**, Ali, S., Jalil, F., Rahman, AU., Ali, M., Hassan, I., 2023. Dengue epidemics in Pakistan: its future management and treatment strategies. Accepted in *Polish Journal of Microbiology*.

Book chapters published

- 1) Malik, HA., Rahman, AU., **Akbar, F.** et al. (2023). Advanced biotechnological tools for improving phosphorus use efficiency. In: Iqbal et al. (eds) *Phosphorous use efficiency for sustainable agriculture*. Springer Nature, Switzerland. *Sustainable Agriculture Reviews* 58, 137-154. https://doi.org/10.1007/978-3-031-16155-1_7.
- 2) Khan, I., Zhang, Y., **Akbar, F.**, Khan, J. (2022). Abiotic Stress Tolerance in Cereals Through Genome Editing. In: Roychoudhury, A., Aftab, T., Acharya, K. (eds) *Omics Approach to Manage Abiotic Stress in Cereals*. Springer, Singapore. 295-315. https://doi.org/10.1007/978-981-19-0140-9_12.
- 3) Zakariya, M., **Akbar, F.**, et al. (2022). Understanding abiotic stress tolerance in plants by proteomics approach. In: Prakash, C.S., Fiaz, S., Fahad, S. (eds) *Principles and Practices of OMICS and Genome Editing for Crop Improvement*. Springer, Cham. 257-277. https://doi.org/10.1007/978-3-030-96925-7_11.
- 4) Zakariya, M., **Akbar, F.**, Rahman, N., Rasool, A., Ahmad, N., Khan, J. (2022). Genetically Engineered Cereals Tolerant to Abiotic Stress. In: Roychoudhury, A., Aftab, T., Acharya, K. (eds) *Omics Approach to Manage Abiotic Stress in Cereals*. Springer, Singapore. 231-257. https://doi.org/10.1007/978-981-19-0140-9_10.
- 5) Rasool, A., Jabeen, H., Israr, M., Shah M., **Akbar, A.** (2022). Transcriptome, proteome and metabolome profiling for abiotic stress tolerance in maize and barley. In: Roychoudhury A. et al. (eds) *OMICs approach to manage abiotic stress in cereals*. Springer, Singapore. 495-512. DOI: 10.1007/978-981-19-0140-9_20
- 6) **Akbar, F.**, Rahman. A., Rehman, A., et al. (2021). The role of phytohormones in combating biotic stress. In: Fahad et al., *Plant growth Regulators for climate-smart agriculture*. Taylor & Francis. 12, 187-206. <https://doi.org/10.1201/9781003109013>
- 7) Rehman, A., Almas, HI., Qayyum, A., et al. (2021). Role of phytohormones in drought stress. In: Fahad et al., *Plant growth Regulators for climate-smart agriculture*. Taylor & Francis. 6, 81-97. <https://doi.org/10.1201/9781003109013>

- 8) Rasool A., **Akbar F.**, Rehman A., Jabeen H. (2020). Genetic Engineering of Rice for Resistance to Insect Pests. In: Roychoudhury A. (eds) Rice Research for Quality Improvement: Genomics and Genetic Engineering. Springer, Singapore., Volume 2, 129-148. <https://doi.org/10.1007/978-981-15-5337-0>.
- 9) Rehman A., Almas H.I., Mazhar K., **Akbar F.**, Ali Q., Azhar MT., Du X. (2020). Breeding approaches to generate biofortified rice for nutritional enhancement. In: Roychoudhury A. (eds) Rice Research for Quality Improvement: Genomics and Genetic Engineering. Springer, Singapore Volume 2, 509-540. https://doi.org/10.1007/978-981-15-5337-0_22.
- 10) Rehman A., Almas H.I., **Akbar F.**, Ali Q., Du X. (2020). An integrated approach for drought tolerance improvement in rice. In: Roychoudhury A. (eds) Rice Research for Quality Improvement: Genomics and genetic Engineering. Springer, Singapore. Volume 1, 293-326. https://doi.org/10.1007/978-981-15-4120-9_12.
- 11) **Akbar F.**, Rahman A.U., Rehman A. (2020). Genetic engineering of rice to survive in nutrient-deficient soil. In: Roychoudhury A. (eds) Rice Research for Quality Improvement: Genomics and genetic Engineering. Springer, Singapore. Volume 1, 437-464. https://link.springer.com/chapter/10.1007/978-981-15-4120-9_19.
- 12) Rizwan, M., Taj-Ud-Din, Ali, Z., Ali, M., **Akbar, F.** et al., 2022. Ethno-medicinal applications of family *Rutaceae*. In: Phytochemical and Pharmacological Investigation of the Family Rutaceae. Apple Academic Press.
- 13) Rahat, M. A. , Saif, S., Shah, M., Rasool, A., Akbar, F., Ali, S., & Israr, M. (2022). Forensic DNA Phenotyping. In P. R. Scendon, & F. De Micco (Eds.), Forensic and Legal Medicine - State of the Art, Practical Applications and New Perspectives. IntechOpen. <https://doi.org/10.5772/intechopen.108995>

Research Supervision:

PhD Supervised:

1. Miss Chand Bibi for her Thesis “Analysis of genetic diversity of begomoviruses complex in District Swat, Pakistan (Thesis Submitted for External Evaluation).
2. Mr. Fazal Hussain for his thesis “The impact of biologically synthesized nanoparticles on lead phytoextraction and growth of selected plants” (Thesis Submitted for External Evaluation).

PhD (under supervision):

3. Mr. Asadullah for his Thesis “Molecular characterization of begomoviruses infecting selected medicinal plants in Swat, Khyber Pakhtunkhwa, Pakistan”.
4. Mr. Ataur Rehman for his thesis “Morphological, biochemical and molecular characterization of the causative agents of peach leaf curl disease in Northern areas of Pakistan”.
5. Mr. Syed Rizwan Ali Shah for his thesis “Population dynamics of whitefly *Bemisia tabacci* and evaluation of begomovirus resistance in tomato”.

M. Phil Supervised

1. Miss Kalsoom Bibi: Thesis title “Phylogenetic and biogeographic analysis of begomovirus complex in Pakistan”.
2. Mr. Akhtar Hamid: Exploration of begomoviruses and associated satellites infecting different crops in Buner region.
3. Mr. Ishaq Khan: Molecular characterization of begomovirus and associated satellites infecting vegetable crops in Swat valley.
4. Mr. Darya Khan: Evaluation of resistance in local peach cultivars and antifungal activity of different plant extracts against *Taphrina* species of peach leaf curl disease.
5. Mr. Ali Shah: Molecular characterization of begomovirus associated satellites infecting *Spanacia oleracea* and *Capsicum annum* plants in Kohat.
6. Mr. Rashid Sultan: Epidemiology of scabies in Buner region.
7. Sumaira Noor: Determination of multidrug resistant bacteria, isolated from patients with respiratory tract infection, admitted in tertiary care hospitals at Peshawar.
8. Kiran Ahmad: Genetic diversity analysis of *Bemisia tabaci* in Swat
9. Hayam: Phylogenetic and biogeographic analyses of *Bemisia tabacci*
10. Shah Hassan: Prevalence of multi-drug resistant tuberculosis patients in District Swat
11. Gulrukh Ahmad: Biogenic synthesis of silver nanoparticles using callus and *in vitro* shoots of *Ajuga bractosa* for antimicrobial activities.
12. Samiullah Khan: Exploration and molecular characterization of mastreviruses infecting crops in swat.
13. Saifullah Khan: Isolation and characterization of Rhizospheric and endophytic bacteria of *Barberis lycium* and their screening against plant fungal pathogens.
14. Fawad Rahman: Evaluation of antifungal activity of nanoparticles and plant extracts against the peach leaf curl disease causing fungi.
15. Syed Saad Jan: Comparative performance of Chinese and Pakistani cotton varieties under the climatic conditions of Swat.
16. Saran Zeb: Detection and rifampicin resistance profile of *Mycobacterium tuberculosis* complex in acute cough patients of tertiary care hospital of District Swat, Khyber Pakhtunkhwa.
17. Kainat Ahmad: Synthesis of silver nanomaterials using green algae *Oedogonium* species and investigation of its bacterial, antioxidant and anti-leishmanial activity.

M. Phil (under supervision):

1. Usman Ali: *In-silico* analysis for the identification of a super strong geminiviral promoter for future use in plant genetic engineering studies
2. Rabia Mir: Assessment, identification and population density of insect pests in economically important crops of District Buner
3. Shama: Identification and population dynamics of insect pests of important field crops in Swat valley
4. Bakht Muhammad: Quantification of SARS-CoV-2 viral load in post-vaccinated COVID-19 infected patients of Khyber Pakhtunkhwa

5. Mujeebur Rahman: Screening of school children for the detection of SARS-COV-2 antibodies and antigens in District Torghar
6. Hafsa Begum: Bibliometric analysis of worldwide publications on antibiotic resistance onwards of 2000 and antibiotic resistance profiling of locally used antibiotics

M.Sc. (Completed)

1. Asif Mehmood: Thesis title “Effect of hepatitis C virus (HCV) infection on human haematology and SGPT level in District Swat” (2015).
2. Fazal Rahman: Thesis title “Incidence and characterization of urinary tract infection in pregnant women in District Swat” (2015).
3. Sabir Ali: Thesis title “Phylogenetic and biogeographic analysis of begomoviruses in Pakistan” (2015).
4. Abdul Basir Khan: Thesis title “Effect of hepatitis B virus (HBV) infection on human haematology and SGPT level in District Malakand” (2015).
5. Inam Ullah: Thesis title “Phylogeny based Biogeographic analysis of genus *Nitrospira*, family *Nitrospiraceae*” (2015).
6. Tanweer Sattar: Thesis title “Phylogenetic and Phylogeographical analysis of *Aedes aegypti* and *Aedes albopictos*” (2015).
7. Neelab and Alwina Karim: Effect of marble industry effluent on soil quality, growth and productivity of vegetable crop, *Lycopersicum esculentum*” (2015).
8. Rabia Qureshi and Sana Karim: Thesis title “Effect of pesticides on haematology, Throid stimulating hormone (TSH) and Tri – iodothyronine (T3) hormone of agriculture workers in Swat” (2015).
9. Muhamamd Iqbal and Imran Anwar: Thesis title “Analysis of groundwater quality parameters in District Swat” (2015).
10. Jan Khan and Tauqeer Rahman: Thesis title “Investigation of scientifically and economically important top 10 human protozoan in Pakistan ” (2015).
11. Azharullah Khan and Aurangzeb: Thesis title “Investigation of scientifically and medically important top 10 human associated viruses in Pakistan ” (2015).
12. Samiullah Khan and Mehwish Shah: Thesis title “Phylogenetic and biogeographic analysis of alphasatellites ” (2015).
13. Kalsoom Rehman and Husna: Thesis title “Investigation of scientifically and medically important top 10 human associated fungi in Pakistan ” (2015).
14. Uzma Iqbal and Erum: Thesis title “Investigation of scientifically and economically important top 10 human associated bacteria in Pakistan ” (2015).
15. Sidra Erum Ishaq and Hayam: Thesis title “Phylogenetic and biogeographic analyses of *Cotton leaf curl Kokhran virus-Burewala*” (2016).
16. Faisla Shah and Ali Shah: Thesis title “Incidence and clinical epidemiology of bacterial disease in Swat region” (2016).
17. Iftikhar Ahmad: Thesis title “Correlation among HBeAg, ALT and HBV DNA in hepatitis B carrier patients” (2016).

18. Muddasir Khan: Thesis title “Incidence and clinical epidemiology of infectious diseases in Peshawar region” (2017).
19. Mehtab Ali, Irfan Khan and Jaweria Niaz: Thesis title “Screening and incidence of hepatitis C virus infection in mentally disabled patients in Swat region” (2016).
20. Zafran Khan, Shahid Iqbal and Ijaz Ali Mian: Thesis title “Incidence of HCV in general population of District Swat” (2016).
21. Sania Ayub and Mahnoor Hamid: Thesis title “Incidence of Typhoid fever in Swat region” (2016).
22. Ayyaz khan and Darya Khan: Thesis title “Bibliomeric analyses of worldwide publications on cotton leaf curl disease research” (2017).
23. Mr. Muhammad Ayaz and Maria Naseeb: Thesis title “Screening and prevalence of hepatitis B virus infection in mentally disabled population of District Swat” (2017).
24. Muhammad Ayaz and Riaz Ahmad: Thesis title “Investigation of HBV and HCV co-infection and their clinical epidemiology in garbage scavengers” (2017).
25. Iqbal Hussain, Shahid Ali, and Zakir Ullah: Thesis title “Incidence of hepatitis B Virus infection in garbage pickers of Malakand Division and Bajaur Agency” (2017).
26. Said Jasim Shah & Muhammad Sardar: Thesis title “Evidences of Mysterious Fish disease in River Swat, Pakistan” (2017).
27. Syed Ishfaq Ahmad, Naeem Akhtar, and Zeeshan Nasir for their Thesis “Characterization and quantification of betasatellite research using bibliometric approach” (2018).
28. Sabitullah, Ibrar Khan, and Ayub Khan, for their thesis “Bibliometric analysis of worldwide research on whitefly (*Bemisia tabaci*) ” (2018).
29. Ziaur Rehman and Salahuddin for their thesis “Characterization and quantification of alphasatellites research” (2018).
30. Muhammad Naeem and Muhammad Zahid for their thesis “A preliminary study to find the pattern of infectious diseases in Buner” (2018).
31. Maneesha Kour for her thesis “Incidence of Chikungunya infection in Swat region” (2018).
32. Amjad Ali for his thesis “Correlation of different risk factors contributing to cardiac disease in population of District Swat” (2018).
33. Sidra Iqbal and Shehla Gul for their thesis “Incidence of Hepatitis C virus in Tehsil Khwazakheela District Swat” (2018).
34. Khalid Usman, Habibul Wahab and Hazrat Izhar “ Prevalence of rabies in Swat and Buner” (2018).
35. Naila Bibi and Hajra Umar “The prevalence of Dengue virus infection in Swat region ” (2018).
35. Shamia Rehman “Constraints in insulin therapy for type II diabetes mellitus patients in District Swat” (2018).
36. Imad Khan and Sajad Gul for their thesis “Association of different risk factors contributing to Hepatitis B virus and Hepatitis C virus infections in hospitalized patients of Swat ” (2019).
37. Iftekhar Ahmad Khan and Asma Haram “Prevalence of Hepatitis C virus infection in hemodialysis patients of District Swat ” (2019).
38. Faiz Ul Haq and Wajahat Ullah “ Incidence of malarial infection and response to antimalarial drugs in Swat and Dir Lower” (2019).

39. Sadiq Ahamd and Jamil Bacha for their thesis “Incidence, symptom s severity and distribution of geminivirus diseases in Swat region”.
40. Syed Saad Jan for his thesis “Molecular detection of begomovirus in *Curcubita maxima*”.
41. Atta Ur Rahman, Najla Khadim, and Nihal Khan, for their Thesis “Isolation, identification and characterization of the causative agents of peach leaf curl disease in Swat”.
42. Muhammad Ibrar and Khalid Hussain for their Thesis “Protocol optimization for the isolation of *Taphrina* species from peach plant”.
43. Muhammad Hasham and Zakir Ullah Khan for their Thesis “Evaluation of resistance in local peach cultivars against peach curl disease”.
44. Naila Bibi and Lubna Zeb for their Thesis “Phytochemical screening and antimicrobial potential of leaves and stem of *Artemisia annua* against pathogenic microorganisms”.
45. Muhammad Imtiaz and Adnan Ur Rahman (2020). for their Thesis “Analysis of the performance of different exotic cotton varieties under the climatic conditions of Swat”.
46. Inam Ullah and Muhammad Abbas (2020). “Prevalence of COVID-19 like symptoms in school going children’s in Babozia Swat”.
47. Owais Khan, Jawad Ali and Waqar Ahmad (2020). “Effect of temperature and humidity on coronavirus infection in Pakistan”.
47. Fida Muhammad, Farooq Khan, and Mehran Khan (2020). “Effect of various auxins on root organogenesis in stem cuttings of medicinally important *Crataegus oxycantha*”.
48. Raies Khan, Saifur Rahman, and Sajad Ali (2020). “Identification of structural genes variation in novel coronavirus-2019 from SARS and MERS using bioinformatics approach”.
49. Humaira Zeb, Anum Iqbal and Habib Ullah (2021). “Medicinal plants used for the treatment of dengue fever: A systematic review”.
50. Sefura Farid, Hajra Bibi and Shakeela Naz (2021). “Antifungal activity of six *Mentha* species against pathogenic *Candida albicans*”.
51. Mehran Albadar and Shoukat Ali Khan (2021). “Evaluation of antibodies response in vaccinated people of District Swat”.
52. Asmat Khan and Jatesh Kumar (2021). “Green synthesis of silver nanoparticles by using aqueous root extract of *Cichorium intybus* and its antibacterial assay”.
53. Irfan Ullah Khan and Rashid Anwar (2021). “Evaluation of antibodies response in COVID-19 recovered patients of District Swat”.
54. Khalid Hussain and Saidullah (2021). “Assessment of the efficacy of COVID-19 vaccination in local population of Swat”.
55. Asma Jahan Zeb and Mehran Musharaf (2022). “Comparative study of the complications produced in response to different COVID-19 vaccines during Omicron variant in population of Swat”.
56. Huma Amir and Robi Aameer (2022). “Investigating the correlation of BCG and Tetanus toxoid vaccinated individuals with COVID-19 in the population of Swat”.
57. Tariq Hussain and Ikram Ullah (2022). “Clinical and phenotypic investigations of families segregating primary microcephaly”.

58. Syed Mushtaq Ali (2022). "Diversity of *Apis mellifera* in honeybee farms in District Swat".

59. Muneeba Bibi (2022). "Human skin diseases in females of District Swat".

Election duty as a Presiding Officer

- Performed Election duty as a Presiding Officer dated May 30, 2015 in Local Government Elections Khyber Pakhtunkhwa, 2015.

Live interview with News channels

- Performed a live interview in a program "Research in focus" with Campus Radio University of Swat, dated June 18, 2015 at 1 pm.
- Performed a live interview in a program "Rawane Chare" with Radio Buner, dated March 3, 2018 at 4 pm.
- Performed a live interview on coronavirus with Radio Shabqadar, Abaseen radio network, dated March 23, 2020 at 4:00 pm.
- Performed a live interview on coronavirus conspiracies with Campus Radio FM 100.4 University of Swat, dated April 30, 2020 at 11:15 am.

Research Interests

- Molecular characterization of economically important geminiviruses, satellites and satellite-like molecules associated with geminiviruses.
- Development of molecular diagnostic tools for geminivirus detection.
- Characterization of geminivirus gene function.
- Characterization of whitefly biotypes, influence on virus transmission efficiency and their distribution.
- Isolation of strong viral promoters and understanding the function of different viral open reading frames (ORFs).
- Genomics, Transcriptomics and proteomics of plant viruses and understanding molecular basis of resistance phenomenon against viral pathogens (host-Virus-interactions).
- Development of Virus Induced Gene Silencing (VIGS) and micro RNA Induced Gene Silencing (MIGS) technology for heterologous protein expression.
- Role of developmental microRNA and microRNA targets in virus infection.
- Plant fungal pathogens causing disease in important horticulture plants.

Research/Project collaboration/ Linkages with National/International organizations

- Developed collaboration with Professor Dr. Liu Chuan Liang, Institute of Cotton Research (ICR) of Chinese Academy of Agricultural Sciences (CAAS), China.
- Developed collaboration with Professor Dr. Cao Ke, Zhengzhou Fruit Research Institute (ZFRI), CAAS, China.
- Developed collaboration with Professor Dr. Judith K, Brown, School of Plant Sciences, University of Arizona, Tucson, USA.
- Developed collaboration with Professor Dr. Hanu Pappu, Department of Plant Pathology, Washington State University, Pullman, WA 99164-6430, USA.
- Developed collaboration with Dr. Imran Amin, Principal Scientist, National Institute for Biotechnology and Genetic Engineering, Faisalabad, Pakistan.
- Developed collaboration with Dr. Malak Bacha, Assistant Professor, Department of Microbiology, Quaid Azam University, Islamabad, Pakistan.
- Developed collaboration with Dr. Haji Akbar, Assistant Professor, COMSAT, Islamabad.

References

References would be provided on request.