

Dr. Sajjad Asaf

Research Assistant Professor



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Languages

Pashto: mother tongue
English: fluent

Bioinformatics

Genome and transcriptome assembly, Canu Assembler, reference and ab initio genome annotation with Maker, Augustus and Braker, Python, R software, dnaSP, RAXML, PAUP, PHYL, MrBayes, Perl, tophat, cuffdiff, cufflinks, DESeq2, edgeR

Skills

Plant microbes interaction, qRT-PCR, phytohormonal analysis, Microbial genome and metagenomics analysis, plant metabolomics, Bio-control of plant pathogen, Modern bioinformatic analysis of NGS data.

Statistics

Publications: 89
Citations: 2129
h-index: 29

education

- 2014–2017 **PhD** Plant Physiology and genomics Kyungpook National University, Daegu, South Korea
Research: Plant microbe's interaction, Plant genomics.
Thesis Title: Physiology and genomics of plant growth promoting bacteria and its role in environmental stress tolerance.
- 2010–2012 **M.Phil** Botany Kohat University of Science and Technology, Pakistan
Graduated with High Distinction.
Thesis Title: Effect of Acacia and Cymbopogon smoke solutions on carrot seed germination and seedling vigour and its comparison with Auxin
- 2008–2010 **Master of Science** Botany Kohat University of Science and Technology, Pakistan
Graduated with High Distinction (Gold Medal)

employment

- 2018–Current **Assistant Professor** University of Nizwa, Oman
Omics and biotechnology lab. Key tasks: Genome sequencing of various medicinally important plant, chloroplast genomes, mitochondrial genomes, sequencing of endophytic microbes by using IonS5 sequencing platform. Genomics and transcriptomics data analysis from different platforms like Illumina and Ion torrents. Taught courses related to genomics, molecular biology and bioinformatics. Guide and supervised undergraduate and master student in various research projects.
- 2017–2018 **Postdoctoral researcher** Kyungpook National University, South Korea
Plant physiology Lab. Key tasks: Genome sequencing and analysis of various plant growth promoting endophytic bacteria and fungi. Chloroplast and mitochondrial genome sequencing. Supervised undergraduate students during their research projects. Taught courses related to plant physiology and plant microbe interaction.
- 2013–2014 **Research Associate** Kohat University of Science and Technology Kohat, Pakistan
Plant Biotechnology Lab. Key tasks: Lab management. Taught courses related to allelopathy and introductory genetic at bachelor level.

publications

- Khan, A. L., **Asaf, Sajjad**, Numan, M., AbdulKareem, N. M., Imran, M., Riethoven, J.-J., Kim, H.-Y., Al-Harrasi, A., Schachtman, D. P., Al-Rawahi, A., "Transcriptomics of tapping and healing process in frankincense tree during resin production" *Genomics* (2021). Elsevier
- Jan, R., Khan, M. A., **Asaf, Sajjad**, Lubna, Lee, I.-J., Kim, K.-M., "Over-Expression of Chorismate Mutase Enhances the Accumulation of Salicylic Acid, Lignin, and Antioxidants in Response to the White-Backed Planthopper in Rice Plants" *Antioxidants* 10.11 (2021)
- Asaf, Sajjad**, Khan, A. L., Al-Harrasi, A., Al-Rawahi, A., "Comparative Analysis of Date Palm (*Phoenix dactylifera* L.) Mitochondrial Genomics" (2021) pp. 211–222. Springer
- Asaf, Sajjad**, Khan, A. L., Jan, R., Khan, A., Khan, A., Kim, K.-M., Lee, I.-J., "The dynamic history of gymnosperm plastomes: Insights from structural characterization, comparative analysis, phylogenomics, and time divergence" *The plant genome* () e20130

- Khan, A. L., Numan, M., Bilal, S., **Asaf, Sajjad**, Crafword, K., Imran, M., Al-Harrasi, A., Al-Sabahi, J. N., Rehman, N. U., Ahmed, A., “Mangrove’s rhizospheric engineering with bacterial inoculation improve degradation of diesel contamination” *Journal of hazardous materials* 423.Pt A () p. 127046
- Khan, M. A., Hamayun, M., **Asaf, Sajjad**, Khan, M., Yun, B.-W., Kang, S.-M., Lee, I.-J., “Rhizospheric Bacillus spp. Rescues Plant Growth Under Salinity Stress via Regulating Gene Expression, Endogenous Hormones, and Antioxidant System of Oryza sativa L” *Frontiers in Plant Science* 12 (2021) p. 1145. *Frontiers*
- Jan, R., **Asaf, Sajjad**, Numan, M., Lubna, Kim, K.-M., “Plant Secondary Metabolite Biosynthesis and Transcriptional Regulation in Response to Biotic and Abiotic Stress Conditions” *Agronomy* 11.5 (2021)
- Khan, A. L., **Asaf, Sajjad**, Al-Rawahi, A., Al-Harrasi, A., “Decoding first complete chloroplast genome of toothbrush tree (Salvadora persica L.): insight into genome evolution, sequence divergence and phylogenetic relationship within Brassicales” *BMC genomics* 22.1 (2021) pp. 1–16. *BioMed Central*
- Khan, M. A., Sahile, A. A., Jan, R., **Asaf, Sajjad**, Hamayun, M., Imran, M., Adhikari, A., Kang, S.-M., Kim, K.-M., Lee, I.-J., “Halotolerant bacteria mitigate the effects of salinity stress on soybean growth by regulating secondary metabolites and molecular responses” *BMC plant biology* 21.1 (2021) pp. 1–15. *BioMed Central*
- Numan, M., Khan, A. L., **Asaf, Sajjad**, Salehin, M., Beyene, G., Tadele, Z., Ligaba-Osena, A., “From Traditional Breeding to Genome Editing for Boosting Productivity of the Ancient Grain Tef [Eragrostis tef (Zucc.) Trotter]” *Plants* 10.4 (2021)
- Asaf, Sajjad**, Khan, A. L., Numan, M., Al-Harrasi, A., “Mangrove tree (Avicennia marina): insight into chloroplast genome evolutionary divergence and its comparison with related species from family Acanthaceae” *Scientific reports* 11.1 (2021) pp. 1–15. *Nature Publishing Group*
- Al-Mahruqi, S., Al-Wahaibi, A., Khan, A. L., Al-Jardani, A., **Asaf, Sajjad**, Alkindi, H., Al-Kharusi, S., Al-Rawahi, A. N., Al-Rawahi, A., Al-Salmani, M., Al-Shukri, I., Al-Busaidi, A., Al-Abri, S. S., Al-Harrasi, A., “Molecular epidemiology of COVID-19 in Oman: A molecular and surveillance study for the early transmission of COVID-19 in the country” *International Journal of Infectious Diseases* 104 (2021) pp. 139–149
- Jan, R., **Asaf, Sajjad**, Paudel, S., Lee, S., Kim, K.-M., “Discovery and Validation of a Novel Step Catalyzed by OsF3H in the Flavonoid Biosynthesis Pathway” *Biology* 10.1 (2021) p. 32. *Multidisciplinary Digital Publishing Institute*
- Jan, R., Khan, M. A., **Asaf, Sajjad**, Lee, I.-J., Bae, J.-S., Kim, K.-M., “Overexpression of OsCM alleviates BLB stress via phytohormonal accumulation and transcriptional modulation of defense-related genes in Oryza sativa” *Scientific reports* 10.1 (2020) pp. 1–15. *Nature Publishing Group*
- Jan, R., Khan, M. A., **Asaf, Sajjad**, Lee, I.-J., Kim, K.-M., “Modulation of sugar and nitrogen in callus induction media alter PAL pathway, SA and biomass accumulation in rice callus” *Plant Cell, Tissue and Organ Culture (PCTOC)* (2020) pp. 1–14. *Springer Netherlands*
- Jan, R., Khan, M. A., **Asaf, Sajjad**, Lee, I.-J., Kim, K.-M., “Overexpression of OsF 3 H modulates WBPH stress by alteration of phenylpropanoid pathway at a transcriptomic and metabolomic level in Oryza sativa” *Scientific Reports* 10.1 (2020) pp. 1–16. *Nature Publishing Group*
- Lubna, **Asaf, Sajjad**, Jan, R., Khan, A. L., Lee, I.-J., “Complete Chloroplast Genome Characterization of Oxalis Corniculata and Its Comparison with Related Species from Family Oxalidaceae” *Plants* 9.8 (2020) p. 928. *Multidisciplinary Digital Publishing Institute*
- Khan, A. L., **Asaf, Sajjad**, Khan, A., Khan, A., Imran, M., Al-Harrasi, A., Lee, I.-J., Al-Rawahi, A., “transcriptomic analysis of Dubas bug (Ommatissus lybicus Bergevin) infestation to Date palm” *Scientific reports* 10.1 (2020) pp. 1–15. *Nature Publishing Group*
- Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Jan, R., Kang, S.-M., Kim, K.-M., Lee, I.-J., “Thermotolerance effect of plant growth-promoting Bacillus cereus SA1 on soybean during heat stress” *BMC microbiology*

Asaf, Sajjad, Khan, A. L., Khan, A., Al-Harrasi, A., “Unraveling the Chloroplast Genomes of Two Prosopis Species to Identify Its Genomic Information, Comparative Analyses and Phylogenetic Relationship” *International Journal of Molecular Sciences* 21.9 (2020)

Khan, A., Khan, A. L., Imran, M., **Asaf, Sajjad**, Kim, Y.-H., Bilal, S., Numan, M., Al-Harrasi, A., Al-Rawahi, A., Lee, I.-J., “Silicon-induced thermotolerance in Solanum lycopersicum L. via activation of antioxidant system, heat shock proteins, and endogenous phytohormones” *BMC Plant Biology* 20.1 (2020) pp. 1–18. *BioMed Central*

Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Jan, R., Kang, S.-M., Kim, K.-M., Lee, I.-J., “Extending thermotolerance to tomato seedlings by inoculation with SA1 isolate of Bacillus cereus and comparison with exogenous humic acid application” *PloS one* 15.4 (2020) e0232228. *Public Library of Science San Francisco, CA USA*

Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Adhikari, A., Jan, R., Ali, S., Imran, M., Kim, K.-M., Lee, I.-J., “Plant growth-promoting endophytic bacteria augment growth and salinity tolerance in rice plants” *Plant Biology* (2020)

Khan, A., Numan, M., Khan, A. L., Lee, I.-J., Imran, M., **Asaf, Sajjad**, Al-Harrasi, A., “Melatonin: Awakening the Defense Mechanisms during Plant Oxidative Stress” *Plants* 9.4 (2020) p. 407. *Multidisciplinary Digital Publishing Institute*

Kang, S.-M., **Asaf, Sajjad**, Khan, A. L., Khan, A., Mun, B.-G., Khan, M. A., Gul, H., Lee, I.-J., “Complete Genome Sequence of Pseudomonas psychrotolerans CS51, a Plant Growth-Promoting Bacterium, Under Heavy Metal Stress Conditions” *Microorganisms* 8.3 (2020) p. 382. *Multidisciplinary Digital Publishing Institute*

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Khan, A. L., **Asaf, Sajjad**, Abed, R. M., Ning Chai, Y., Al-Rawahi, A. N., Mohanta, T. K., Al-Rawahi, A., Schachtman, D. P., Al-Harrasi, A., “Rhizosphere Microbiome of Arid Land Medicinal Plants and Extra Cellular Enzymes Contribute to Their Abundance” *Microorganisms* 8.2 (2020) p. 213. *Multidisciplinary Digital Publishing Institute*

Asaf, Sajjad, Numan, M., Khan, A. L., Al-Harrasi, A., “Sphingomonas: from diversity and genomics to functional role in environmental remediation and plant growth” *Critical Reviews in Biotechnology* (2020) pp. 1–15. *Taylor & Francis*

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Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Adhikari, A., Jan, R., Ali, S., Imran, M., Kim, K.-M., Lee, I.-J., “Halotolerant Rhizobacterial Strains Mitigate the Adverse Effects of NaCl Stress in Soybean Seedlings” *BioMed Research International* 2019 (2019). *Hindawi*

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Jan, R., Khan, M. A., **Asaf, Sajjad**, Lee, I.-J., Kim, K. M., “Metal resistant endophytic bacteria reduces cadmium, nickel toxicity, and enhances expression of metal stress related genes with improved

- growth of *Oryza Sativa*, via regulating its antioxidant machinery and endogenous hormones” *Plants* 8.10 (2019) p. 363. *Multidisciplinary Digital Publishing Institute*
- Khan, M. A., Khan, A. L., Imran, Q. M., **Asaf, Sajjad**, Lee, S.-U., Yun, B.-W., Hamayun, M., Kim, T.-H., Lee, I.-J., “Exogenous application of nitric oxide donors regulates short-term flooding stress in soybean” *PeerJ* 7 (2019) e7741. *PeerJ Inc.*
- Khan, A., Khan, A. L., **Asaf, Sajjad**, Al-Harrasi, A., Al-Rawahi, A., “DNA extraction from resin producing *Boswellia tree*” ()
- Kang, S.-M., Khan, A. L., Waqas, M., **Asaf, Sajjad**, Lee, K.-E., Park, Y.-G., Kim, A.-Y., Khan, M. A., You, Y.-H., Lee, I.-J., “Integrated phytohormone production by the plant growth-promoting rhizobacterium *Bacillus tequilensis* SSB07 induced thermotolerance in soybean” *Journal of Plant Interactions* 14.1 (2019) pp. 416–423. *Taylor & Francis*
- Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Jan, R., Kang, S.-M., Kim, K.-M., Lee, I.-J., “Rhizobacteria AK1 remediates the toxic effects of salinity stress via regulation of endogenous phytohormones and gene expression in soybean” *Biochemical Journal* 476.16 (2019) pp. 2393–2409. *Portland Press Ltd.*
- Khan, A., **Asaf, Sajjad**, Khan, A. L., Khan, A., Al-Harrasi, A., Al-Sudairy, O., AbdulKareem, N. M., Al-Saady, N., Al-Rawahi, A., “Complete chloroplast genomes of medicinally important *Teucrium* species and comparative analyses with related species from Lamiaceae” *PeerJ* 7 (2019) e7260. *PeerJ Inc.*
- Kang, S.-M., Shahzad, R., Bilal, S., Khan, A. L., Park, Y.-G., Lee, K.-E., **Asaf, Sajjad**, Khan, M. A., Lee, I.-J., “Indole-3-acetic-acid and ACC deaminase producing *Leclercia adecarboxylata* MO1 improves *Solanum lycopersicum* L. growth and salinity stress tolerance by endogenous secondary metabolites regulation” *BMC microbiology* 19.1 (2019) p. 80. *BioMed Central*
- Khan, M. A., **Asaf, Sajjad**, Khan, A. L., Ullah, I., Ali, S., Kang, S.-M., Lee, I.-J., “Alleviation of salt stress response in soybean plants with the endophytic bacterial isolate *Curtobacterium* sp. SAK1” *Annals of Microbiology* 69.8 (2019) pp. 797–808. *Springer International Publishing*
- Lubna, L., **Asaf, Sajjad**, Khan, A. L., Waqas, M., Kang, S.-M., Hamayun, M., Lee, I.-J., Hussain, A., “Growth-promoting bioactivities of *Bipolaris* sp. CSL-1 isolated from *Cannabis sativa* suggest a distinctive role in modifying host plant phenotypic plasticity and functions” *Acta Physiologiae Plantarum* 41.5 (2019) p. 65. *Springer Berlin Heidelberg*
- Ali, A., Mohanta, T. K., **Asaf, Sajjad**, Rehman, N., Al-Housni, S., Al-Harrasi, A., Khan, A. L., Al-Rawahi, A., “Biotransformation of benzoin by *Sphingomonas* sp. LK11 and ameliorative effects on growth of *Cucumis sativus*” *Archives of microbiology* 201.5 (2019) pp. 591–601. *Springer Berlin Heidelberg*
- Shahzad, R., Khan, A. L., Waqas, M., Ullah, I., Bilal, S., Kim, Y.-H., **Asaf, Sajjad**, Kang, S.-M., Lee, I.-J., “Metabolic and proteomic alteration in phytohormone-producing endophytic *Bacillus amyloliquefaciens* RWL-1 during methanol utilization” *Metabolomics* 15.2 (2019) p. 16. *Springer US*
- Imran, Q. M., Lee, S.-U., Mun, B.-G., Hussain, A., **Asaf, Sajjad**, Lee, I.-J., Yun, B.-W., “WRKYs, the Jack-of-various-Trades, Modulate Dehydration Stress in *Populus davidiana*—A Transcriptomic Approach” *International journal of molecular sciences* 20.2 (2019) p. 414. *Multidisciplinary Digital Publishing Institute*
- Arif, K., **Asaf, Sajjad**, Khan, A. L., Al-Harrasi, A., Al-Sudairy, O., AbdulKareem, N. M., Khan, A., Shehzad, T., Alsaady, N., Al-Lawati, A., Al-Rawahi, A., “First complete chloroplast genomics and comparative phylogenetic analysis of *Commiphora gileadensis* and *C. foliacea*: Myrrh producing trees” *PloS one* 14.1 (2019). *Public Library of Science*
- Khan, A. L., **Asaf, Sajjad**, Lee, I.-J., Al-Harrasi, A., Al-Rawahi, A., “First reported chloroplast genome sequence of *Punica granatum* (cultivar Helow) from Jabal Al-Akhdar, Oman: phylogenetic comparative assortment with *Lagerstroemia*” *Genetica* 146.6 (2018) pp. 461–474. *Springer International Publishing*
- Bilal, S., Ali, L., Khan, A. L., Shahzad, R., **Asaf, Sajjad**, Imran, M., Kang, S.-M., Kim, S.-K., Lee, I.-J.,

“Endophytic fungus *Paecilomyces formosus* LHL10 produces sester-terpenoid YW3548 and cyclic peptide that inhibit urease and α -glucosidase enzyme activities” *Archives of microbiology* 200.10 (2018) pp. 1493–1502. Springer Berlin Heidelberg

Asaf, Sajjad, Khan, A. L., Khan, M. A., Al-Harrasi, A., Lee, I.-J., “Complete genome sequencing and analysis of endophytic *Sphingomonas* sp. LK11 and its potential in plant growth” 3 Biotech 8.9 (2018) p. 389. Springer International Publishing

Khan, M. A., Hamayun, M., Iqbal, A., Khan, S. A., Hussain, A., **Asaf, Sajjad**, Khan, A. L., Yun, B.-W., Lee, I.-J., “Gibberellin application ameliorates the adverse impact of short-term flooding on *Glycine max* L.” *Biochemical Journal* 475.18 (2018) pp. 2893–2905. Portland Press Ltd.

Khan, A. L., **Asaf, Sajjad**, Lee, I.-J., Al-Harrasi, A., Al-Rawahi, A., “First chloroplast genomics study of *Phoenix dactylifera* (var. Naghal and Khanezi): A comparative analysis” *PloS one* 13.7 (2018). Public Library of Science

Asaf, Sajjad, Khan, A. L., Al-Harrasi, A., Kim, T. H., Lee, I.-J., “The first complete mitochondrial genome of wild soybean (*Glycine soja*)” *Mitochondrial DNA Part B* 3.2 (2018) pp. 527–528. Taylor & Francis

Shahzad, R., Khan, A. L., Bilal, S., **Asaf, Sajjad**, Lee, I.-J., “What is there in seeds? Vertically transmitted endophytic resources for sustainable improvement in plant growth” *Frontiers in plant science* 9 (2018) p. 24. Frontiers

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Lubna, **Asaf, Sajjad**, Hamayun, M., Gul, H., Lee, I.-J., Hussain, A., “*Aspergillus niger* CSR3 regulates plant endogenous hormones and secondary metabolites by producing gibberellins and indoleacetic acid” *Journal of plant interactions* 13.1 (2018) pp. 100–111. Taylor & Francis

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Waqas, M., Shahzad, R., Hamayun, M., **Asaf, Sajjad**, Khan, A. L., Kang, S.-M., Yun, S., Kim, K.-M., Lee, I.-J., “Biochar amendment changes jasmonic acid levels in two rice varieties and alters their re-

- sistance to herbivory” *PloS one* 13.1 (2018). *Public Library of Science*
- Khan, A. L., **Asaf, Sajjad**, Al-Rawahi, A., Lee, I.-J., Al-Harrasi, A., “Rhizospheric microbial communities associated with wild and cultivated frankincense producing *Boswellia sacra* tree” *PloS one* 12.10 (2017). *Public Library of Science*
- Asaf, Sajjad**, Waqas, M., Khan, A. L., Khan, M. A., Kang, S.-M., Imran, Q. M., Shahzad, R., Bilal, S., Yun, B.-W., Lee, I.-J., “The complete chloroplast genome of wild rice (*Oryza minuta*) and its comparison to related species” *Frontiers in plant science* 8 (2017) p. 304. *Frontiers*
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- Asaf, Sajjad**, Khan, A. L., Khan, A. R., Waqas, M., Kang, S.-M., Khan, M. A., Lee, S.-M., Lee, I.-J., “Complete chloroplast genome of *Nicotiana glauca* and its comparison with related species” *Frontiers in plant science* 7 (2016) p. 843. *Frontiers*
- Back, C. G., Lee, S. Y., **Asaf, Sajjad**, Rang, I. K., Jung, H. Y., Ohga, S., “Identification and characterization of a new species, *Cladobotryum hypsigum*, that causes cobweb disease in beech mushroom (*Hypsizygus marmoreus*) in Korea” *Journal of the Faculty of Agriculture, Kyushu University* 60.1 (2015) pp. 7–12. *Faculty of Agriculture, Kyushu University*
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- Asaf, Sajjad**, Khan, A. L., Khan, A. R., Waqas, M., Kang, S.-M., Khan, M. A., Shahzad, R., Seo, C.-W., Shin, J.-H., Lee, I.-J., “Mitochondrial genome analysis of wild rice (*Oryza minuta*) and its comparison with other related species” *PloS one* 11.4 (2016). *Public Library of Science*

Current projects

- Genome sequencing and analysis of different plants, bacteria and fungi.
- Mitochondrial genome sequencing of important plants, fungi and their comparative analysis with related species.
- Chloroplast genome sequencing and comparative analysis of gymnosperms. Infer phylogenetic position of gymnosperms on the basis of complete chloroplast genomes.
- Metagenomic analysis of rhizospheric bacteria associated with medicinally important plants growing in harsh conditions.
- Role of plant growth promoting bacteria during abiotic stresses (salinity/drought/ flood/ heavy metal).
- Whole plant genome sequencing and transcriptomics analysis of date palm (*Phoenix dactylifera*) and pomegranate (*Punica granatum*) plants.
- The first draft genome and evolutionary history of frankincense producing *Boswellia sacra*

plant.

- Transcriptomic analysis of Date palm during Dubas bug (*Ommatissus lybicus* Bergevin) infection.
- Molecular responses involved in wound-induced tapping of *Boswellia sacra* tree for Frankincense.
- Sugar synthesis related genes expression pattern during fruit developmental stages of various *Phoenix dactylifera* L. cultivars.
- Metabolomic and genetic diversity in frankincense tree populations.

awards & funding

2019	Faculty Mentored Undergraduate Research Award Program Nizwa, Oman	University of
	Grant to cover the First Chloroplast genomics and barcoding of <i>Commiphora foliacea</i> and <i>Commiphora gileadensis</i> from Dhofar region	
2018	Faculty Mentored Undergraduate Research Award Program Oman	University of Nizwa,
	Grant to cover the chloroplast DNA extraction and sequencing of important Omani date palm varieties	
2017	Awarded Brain Korea (BK-21 Plus) fellowship Korea	Kyungpook National University, South
	Two year fellowship to pursue research at Kyungpook National University	
2014	Awarded KNU Honour Scholarship for PhD studies South Korea	Kyungpook National University,
	Three years scholarship for PhD studies	
2012	Awarded Gold Medal	Kohat University, Pakistan
	Awarded a Gold medal and graduated with distinction	

teaching

2020-current	University teaching	University of Nizwa
	supervise and co-supervise undergraduate students, computational analysis for biology students and various current projects	
2019	Introduction to genomics and molecular biology	University of Nizwa
	Introduction to microbial genomics and basic analysis	
2019	Introduction to bioinformatics	University of Nizwa
	Introduction to bioinformatic, NCBI Blast, download fasta files and sequence alignment.	
2018	Plant microbe interaction	University of Nizwa
	Introduction to plant microbe interaction and use of plant growth promoting bacteria to alleviate salinity stress.	
2018	Plant physiology and genome	University of Nizwa
	Introduction to phytohormones and secondary metabolites.	
2017	Genome sequencing and analysis of endophytic bacteria	Kyungpook National
	Genome sequencing and analysis of various plant growth promoting endophytic bacteria.	

presentations

- 2018 **Chloroplast and mitochondrial genome sequencing of *Boswellia sacra* and its comparative analysis** Oman
Sultan Qaboos Univesity, Oman
- 2017 **Plant growth promoting rhizospheric bacteria isolated from sand dunes of Pohang coastal area** South Korea
Youth Development Programme for Revolutionary 4-H Agricultural Bio-indutry Scholarship Symposium.
- 2015 **Specific PCR-based assay for detection of three *Xanthomonas* species infecting bulbs and flowers.** japan
100th Anniversary Meeting of The Phytopathological Society of Japan
- 2016 **The complete genome sequence of the plant growth promoting bacterium *Sphingomonas taxi* LK11** South Korea
International symposium and annual meeting of the KSABC
- 2014 **Development and application of rapid and sensitive detection of *Marssonina ko coronaria* causing apple blotch disease by using loop-mediated isothermal amplification assay** South Korea
The Korean society of Plant Pathology

editorial responsibilities

- 2019 Review editor in Scientific reports
- 2018 Review editor in Frontier in Plant Sciences
- 2017 Review editor in PLOsone
- 2017 Review editor in Journal of Crop Science and Biotechnology