KHWAJA FAREED UEIT RAHIM YAR KHAN

CLIMATE ACTION

An extraordinary journey made, a long journey ahead

Khwaja Fareed University of Engineering and Information technology

Contents

1 Research and Development Projects

1.1 Installation of Wastewater Treatment Plant

The university has established Wastewater Treatment Plant to treat the university sewage water. The primary objective of this project is to design an onsite wastewater treatment plant for the University that would serve as a more sustainable and cost-efficient method of treatment.

The sewage is properly cycled for the further use. The recycled wastewater main utilization is for the irrigation purpose to the lawns of KFUEIT and research trials on the agriculture research farm. This recycled water is also used for toilet, car wash purpose and other purpose.

Figure 1: Wastewater Treatment Plant at the KFUEIT

Reference/ Weblink:

- https://youtu.be/0lTjMdnlydo
- https://ne-np.facebook.com/kfueit.official/videos/rohi-channel-carries-a-news-of-water-treatment-plant-to-purify-sewerage-water-an/1216714868791727/
- https://www.facebook.com/watch/?ref=search&v=1216714868791727&external_log_id=22efd772-bc61-43eb-bf22-edfafe9b5aa3&q=water%20treatment%20kfueit

1.2 Operation of Wastewater Treatment Plant through Solar Energy

The wastewater treatment plant is operated through the solar energy which will reduce the impact on conventional energy sources and our climate.

Figure 2: Solar Assisted Wastewater Treatment Plant

1.3 Treatment of Organic Waste

Organic waste is collected from all around the university. This waste is used in a number of recycling methods including bio-gas, compost making, and clean combustion etc. the details are presented below.

Figure 3: Three Bin System at the KFUEIT

Figure 4: Biogas Plant

Figure 5: Burning of the smoke free, clean biomass in the indegenously developed stoves

Figure 6: Biodiesel Production and Testing

Figure 7: Compost (organic) used to grow plants

1.4 Inorganic Waste Treatment

The inorganic waste is extensively treated and recycled. Different type of waste is separated and recycled accordingly. For example, the plastic bottles are collected, washed, cut and made into useful products.

Figure 8: Waste plastic being washed and prepared for product making

Figure 9: Containers produced from waste plastics

1.5 Toxic Waste Handling

The toxic waste is collected separately and dealt with precaution. Different types of wastes are properly labeled and instructions for students and staff are communicated via lecture and posters. The toxic waste is handled by a certified third party (shaikh zayed hospital). This is the only certified company operating in the area.

Figure 10: Toxic Waste Handling

1.6 Program to Reduce the Use of Paper and Plastic in Campus

The KFUEIT has taken many initiatives to reduce the use of paper and plastics in campus. For instance, the employees' data is kept online via MIS tool developed by the KFUEIT. It provided wide range of services online to eliminate the need of paper; including complete record of the employee, leave application process, apply for NOC etc. The Case management system is developed to address various issues and problems via online, which eliminates the need for written application to be submitted. The Leaning management system (LMS) is indigenously developed by KFUEIT to facilitate the learning experience of students as well as reduce the need of paper and printing. If absolutely necessary, the papers are printed but it is ensured that they are printed on both sides as a policy. Use of plastics for the paper binding, reports cover, and single-use plastics are highly discouraged. A series of seminars and trainings are conducted for efficient usage of resources and to reduce various types of wastes throughout the year.

Following are few projects secured and events organized regarding waste minimization and reduce the need for paper and plastic usage.

1. https://www.facebook.com/kfueit.official/photos/pcb.1953412864817513/1953412801484186/
2. https://www.facebook.com/kfueit.official/photos/pcb.1953360178156115/1953360068156126

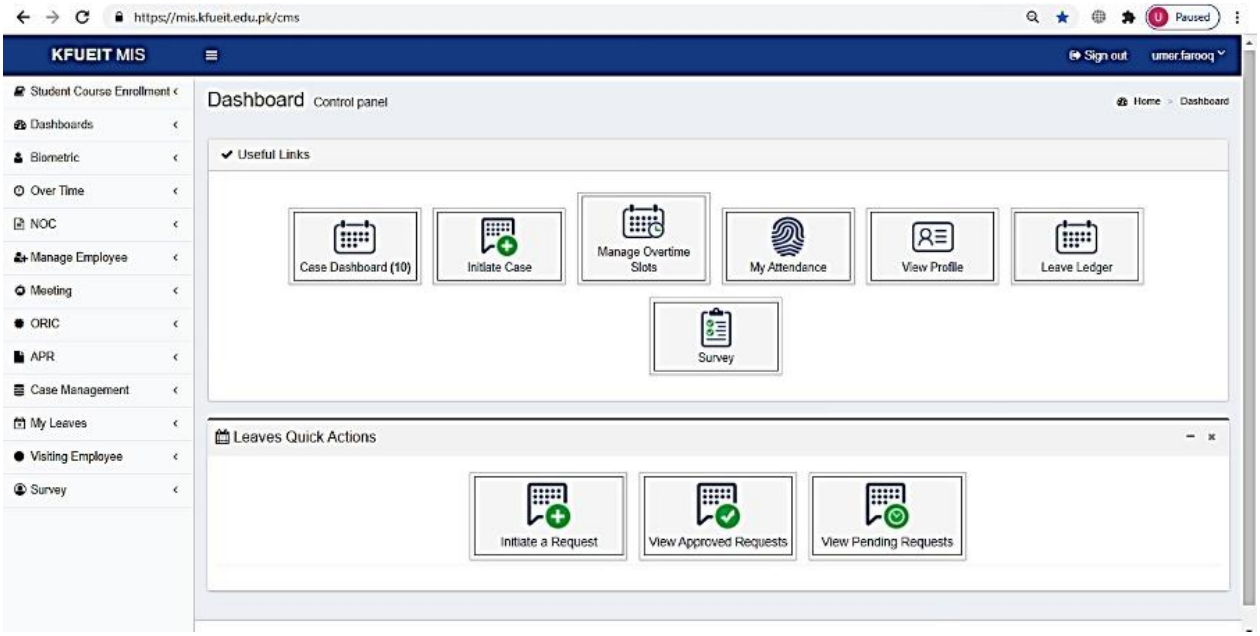


Figure 13: Online MIS System for the KFUEIT Staff

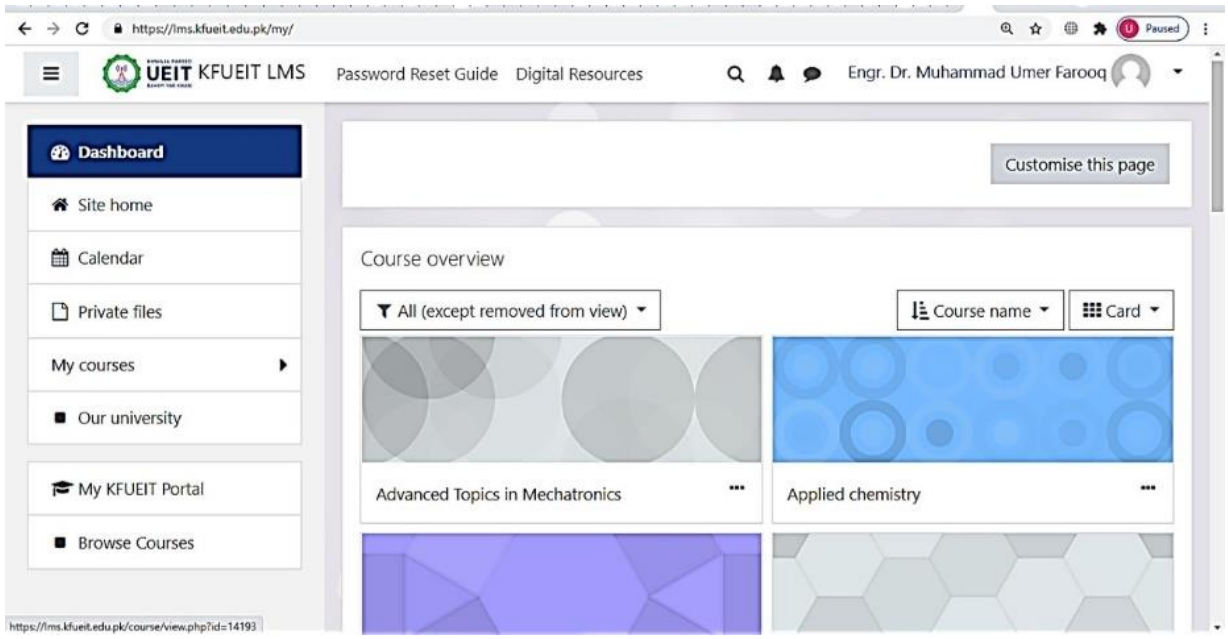


Figure 14: Online LMS System for Faculty and Students

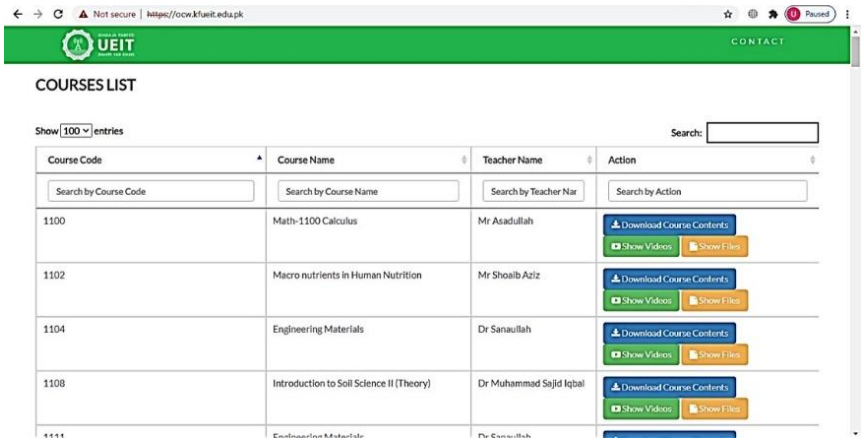


Figure 15: KFUEIT OpenCourseWare for the Students

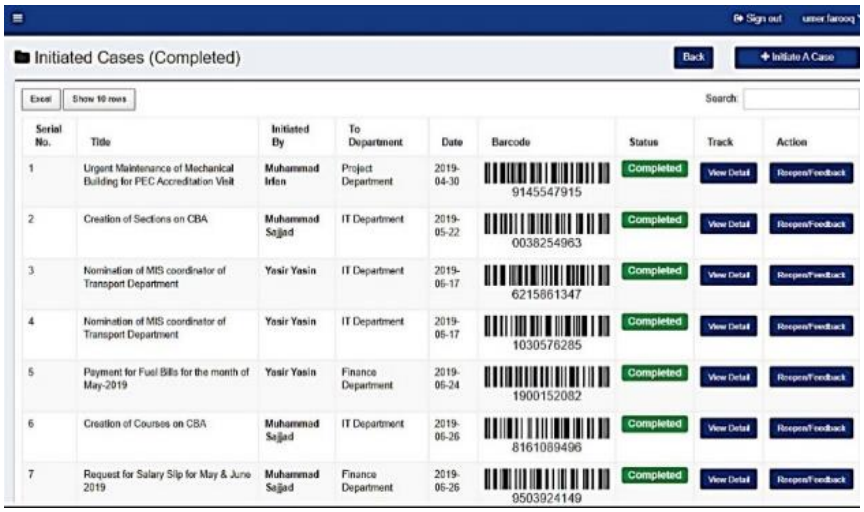


Figure 16: Online Case Management System for the Faculty and Staff

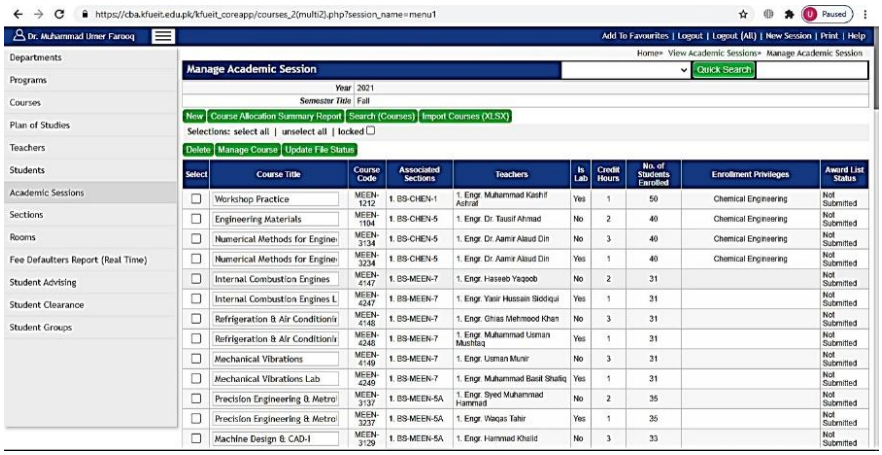


Figure 17: CBA system for complete examination data, enrollment, teacher allocation, result submission etc

1.7 Implementation of Water Conservation Program

1. At KFUEIT, cemented based Water Channels lining was done to save the seepage losses of the fresh water. A lined channel also gives the water a defined pathway to follow to its destination. The loss of water is minimized.
2. Precision Surface Irrigation at Agriculture Research Farm of the KFUEIT is conducted. This is the novel approach of High Efficiency Irrigation System with the irrigation efficiency of more than 85% at the specified given slope. This approach is based on the simulation of modeling. Water is applied based on the proper calculation to as per defined slope of the field. Slope of the field is maintained at the time cultivation using laser grading.
3. Water conservation is also performed in on the basis of the on-farm water storage at the time of excessive water availability. This water is stored in the Ground Water Tank at KFUEIT and applied in the field at the time of canal water closure or at the time of peak demand where canal water availability is less than the requirement.
4. Installation of Rain harvesting system for the irrigation purpose in the lawn.
5. Automatic on/off taps as a policy to replace manual taps
6. Use of moveable rain gun system for the irrigation of the lawns. A well adopted approach of High Efficiency irrigation System.
7. Installation of the tensiometer for the application of the demand-based irrigation. Application of Irrigation based on the designed Management Allowable Deficit of the soil moisture for the better crop production.

Figure 18: Cemented Water Channels

Figure 19: Precision Surface Irrigation at Agriculture Research Farm of the KFUEIT

Figure 21:Automatic on/off taps as a policy to replace manual taps

Figure 20: Rainwater Harvesting

1.8 Development of Solar Assisted Dryer

A solar assisted dryer was fabricated by Engr. Dr. Kamran Ikram in the department of agricultural engineering. The dryer was operated on solar energy decreasing application of fossil fuels for heating of drying air.

A Solar concentrator is under construction. The purpose of concentrator is to get heat energy for farm operations and for distillation process. Engr. Dr. Kamran Ikram and Engr. Faizan Shabir are working on this project.

Figure 22: Solar Assisted Dryer

1.9 Commercialization of Organic Moringa Powdered

Organic Moringa leaf powder products which is developed organically, no synthetic chemical fertilizer and pesticides used during its production. Which is environment friendly and have no side effect.

Figure 23: Commercialization of Organic Moringa Leaf Powder

1.10 Brassinolide (Biofertilizer) impacts on the yield parameter of cereal crops

- A collaborative project of KFUEIT and Nongfenji Information Technology (Jiangsu) Co, Ltd, Nanjing, China.
- Environment friendly Biofertilizers are tested to increase overall crop yield of cereal crops including rice, wheat and maize
- Project is led by Dr. Muhammad Adnan Bodlah (Assistant Professor) and team

Figure 24: Project on Brassinolide (Biofertilizer) Impact on Crop Yield

1.11 Electrical Bikes and Bicycles Distribution

Electrical bikes ad bicycles have been distributed among the staff members of KFUEIT to reduce the consumption of fossil-based fuels and subsequent emissions to the environment. The details are depicted in the following pictures:

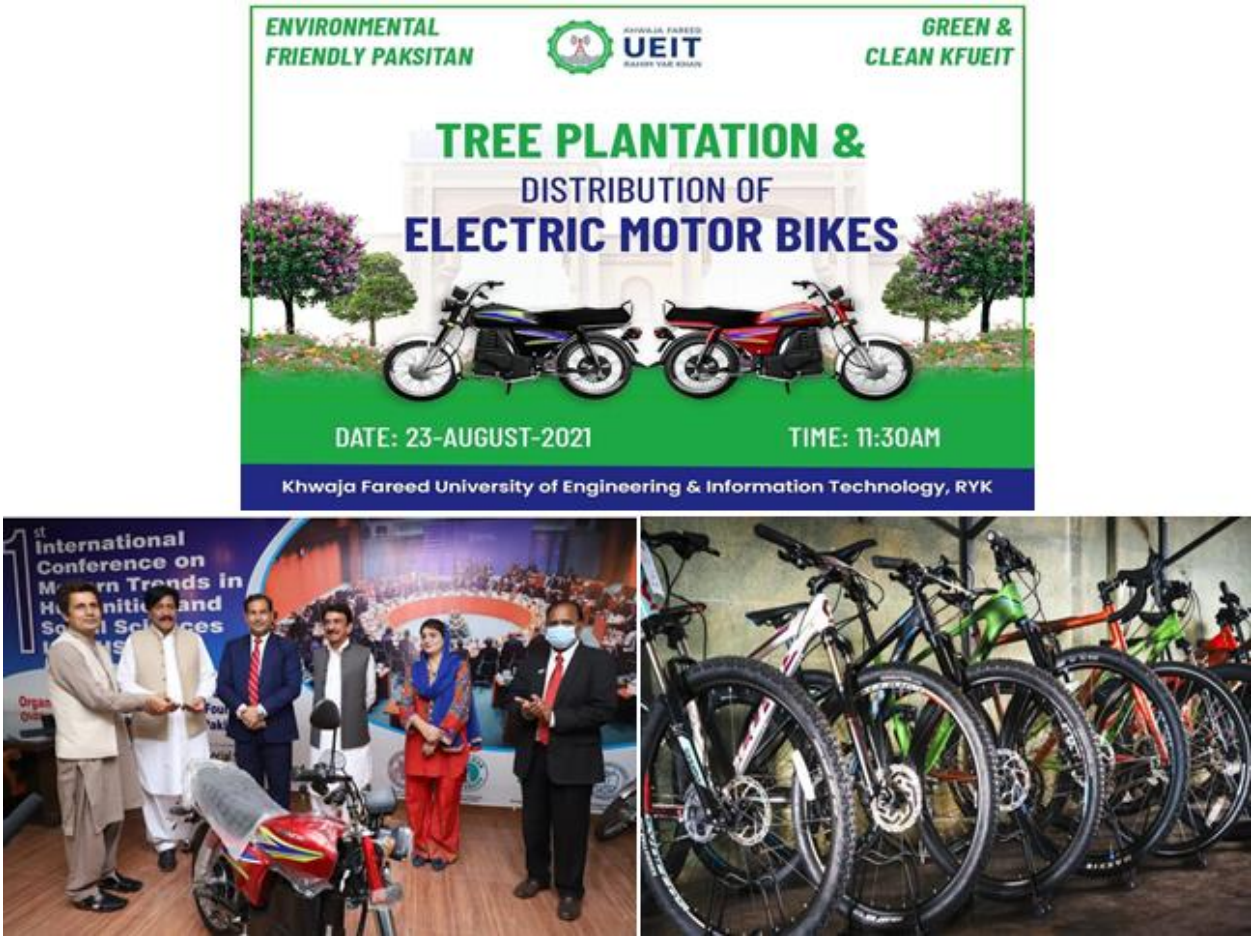


Figure 25: Electric Bikes and Bicycle Distribution

2 Publications

2.1 Research Papers Under the Banner of Fareed Biodiversity Conservation Center

1. **Bodlah, M. A**. Bodlah, I. Rasheed, M. T. Fareen, A. G. Ikram, k. Iqbal, Z & Zada, R. 2021. Coccinellidae Beetles (Coleoptera) Fauna of district Layyah of Southern Punjab, Pakistan. Asian Journal of Agriculture and Biology. DOI: 10.35495/ajab.2020.05.299
2. **Bodlah, M. A.** Yasir Niaz, Muhammad Tariq Rasheed, Ammara Gull e Fareen, Muhammad Nawaz, Kamran Ikram, Muhammad Mohsin Waqas, Bilal Rasool, Imran Bodlah. 2020. Contribution to Non-Apis bee Fauna of Family Apidae (Hymenoptera) from Layyah, Punjab, Pakistan. Asian Journal of Agriculture and Biology. doi.org/10.35495/ajab.2020.04.227
3. Rasheed M. T, Bodlah, I., Magomedovich, Y. Z., Fareen, G. A., **Bodlah, M. A**., Prebus, M., Wachkoo, A. A. 2020. Preliminary contributions toward a revision of the ant genus Temnothorax Mayr (Hymenoptera: Formicidae) from Pakistan. Turk J Zool. 44. doi:10.3906/zoo-2003-54. (IF: 0.680).
4. Rasool, B. Nabi, Z. **Bodlah, M.A**. Afzal, N. Samiullah, K. Rasool, W. Rasool, R. 2020. Host food preference, screening and phylogenetic analysis of Wolbachia in Myzus persicae populations. Asian Journal of Agriculture and Biology. DOI: 10.35495/ajab.2020.04.224
5. Fareen, G. A. Bodlah, I, Rasheed, M. T, Niaz, Y. & **Bodlah, M. A**. 2020. Trophic association of ants with aphid partners and new distributional records of some ants in Pothwar region of Pakistan. Pakistan Journal of Zoology (IF:0.79).
6. Zhongxian Lu, Hongxing Xu, M.D Ali, Xiaogai Liu, Ying-Hong Liu, **Bodlah, M. A**. yajun Yang. 2020. The abundance and diversity of gut bacteria of rice leaffolder Cnaphalocrocis medinalis (Guenée) across life stages. Journal of Asia pacific Entomology (IF: 0.967).
7. Fareen, G. A. Bodlah, I. Asif, M. Rasheed, M. T. Hamid, S. & **Bodlah, M. A**. 2020. Colour and Distributional Pattern of Callaspidia notata (Boyer de Fonscolombe, 1832) (Hymenoptera: Figitidae: Aspicerinae) from Pakistan. Pakistan Journal of Zoology. (IF:0.79).
8. Rasheed, M. T., I. Bodlah, A. Gull e Fareen, M. U. Raja and **M. A. Bodlah**. 2020. Distribution and trophic association of ants Genus Monomorium Mayr, 1855 (Hymenoptera: Formicidae: Myrmicinae) with aphids in Pothwar Region of Pakistan. Journal of Animal and Plant Sciences. (IF= 0.53)

9. Ayesha Siddiqui, Mansoor Hameed, Muhammad Noaman Tayyab, **Bodlah, M.A**. 2020. Plant Diversity Recorded At Kuppi Artificial Forest Plantation In Pakistan. Big Data In Agriculture, 2(2): 41-44.
10. **Bodlah, I**., Muhammad Tariq Rasheed, Xiaolei Huang, Ammara Gull-e-Fareen, Junaid Ali Siddiqui and Bodlah, M. A., 2019. First record of two species of Genus Messor Forel, 1890 (Hymenoptera: Formicidae: Myrmecinae) along with trophic associations with aphids from Pakistan. Journal of Animal and Plant Sciences. (IF: 0.53)
11. Hassan, M. A., Bodlah, I., Aihetasham, A., **Bodlah, M.A.,** Hussain, K. 2019. First record of *Baccha maculata* Walker, 1852 (Diptera: Syrphidae) from the Pothwar Punjab, Punjab University Journal of Zoology.
12. Hassan, M. A., Bodlah, I., **Bodlah, M. A**., & Hussain, R. 2019. New records of the genus Ceriana Rafineque, 1815 (Diptera: Syrpidae) from Pakistan. Munis Entomology and Zoology Journal 14(1):185-187.

2.2 Conference Papers under the Banner of Fareed Biodiversity Conservation Center

13. Apis and Non-Apis bee Fauna (Apoidea: Hymenoptera) of District Rahim Yar Khan, Punjab, Pakistan
    https://www.researchgate.net/publication/344646802_Contribution_to_non-Apis_bee_fauna_of_family_Apidae_Hymenoptera_from_Layyah_Punjab_Pakistan
14. Bee pollinators Diversity in the Canola (Brassics napus L) Crop Gown in the Semi-arid Condition of Rahim Yar Khan (Punjab), Pakistan.
    https://www.researchgate.net/publication/352329612_Bee_pollinators%27_Diversity_in_the_Canola_Brassica_napus_L_Crop_Grown_in_the_Semi-arid_Conditions_of_Rahim_Yar_Khan_Punjab_Pakistan
15. Determination of Effect Processing and Time Period on Physicochemical Properties of Sedir and Acacia Honey from Apis mellifera
    https://www.researchgate.net/publication/352329766_Determination_of_Effect_Processing_and_Time_Period_on_Physicochemical_Properties_of_Sedir_and_Acacia_Honey_from_Apis_mellifera

16. Hemolytic Activity of Pathogenic Bacteria, Erythrocyte Membrane Protection and Immune-Stimulatory Effects of Saudi Honeys
https://www.researchgate.net/publication/352329763_Hemolytic_Activity_of_Pathogenic_Bacteria_Erythrocyte_Membrane_Protection_and_Immune_Stimulatory_Effects_of_Saudi_Honeys
17. Pollination Capability and Host Plants of the European Honey Bee (Apis mellifera Linnaeus) in the Arid to Semi-arid conditions of the District Rahim Yar Khan (Punjab), Pakistan.
https://www.researchgate.net/publication/352329838_Pollination_Capability_and_Host_Plants_of_the_European_Honey_Bee_Apis_mellifera_Linnaeus_in_the_Arid_to_Semi-arid_conditions_of_the_District_Rahim_Yar_Khan_Punjab_Pakistan

2.3 Research Papers by the Faculty Members of Various Departments

18. Yaqoob H, Teoh YH, Jamil MA, Din ZU, Ul Hassan M, Jamil M, et al. Feasibility Study of a 50 MW wind farm project in Pakistan. Journal of Advanced Research in Fluid Mechanics and Thermal Sciences 2020;74:27–42. doi:10.37934/ARFMTS.74.2.2742.
19. Yaqoob H, Teoh YH, Sher F, Jamil MA, Murtaza D, Qubeissi M Al, et al. Current Status and Potential of Tire Pyrolysis Oil Production as an Alternative Fuel in Developing Countries. Sustainability 2021;13:3214.
20. Jamil MA, Yaqoob H, Farooq MU, Teoh YH, Xu B Bin, Mahkamov K, et al. Experimental Investigations of a Solar Water Treatment System for Remote Desert Areas of Pakistan. Water 2021;13:1070. doi:10.3390/w13081070.
21. Yaqoob H, Teoh YH, Sher F, Ashraf MU, Amjad S, Jamil MA, et al. Jatropha Curcas Biodiesel : A Lucrative Recipe for Pakistan's Energy Sector. Processes 2021;9:1129.
22. "Categorizing the barriers in adopting sustainable supply chain initiatives: A way-forward towards business excellence" published in "Cogent Business & Management" authored by "M. Nazam , M. Hashim , S. A. Baig , M. Abrar , H. Ur Rehman , **M. Nazim** & A. Raza"
23. **"**The Power of Green Brand Loyalty: Exploring the Effect of Green Perceived Value, Green Perceived Risk and Green Trust on the Green Repurchase Decision" published in "Paradigms" authored by "**M. Nazim**, M. S Sharif, N. Zeb, A. Maqbool, M. Zahar, & A. Bakhas"

24. **“**MODELING SUPPLY CHAIN SUSTAINABILITY-RELATED RISKS AND VULNERABILITY: INSIGHTS FROM THE TEXTILE SECTOR OF PAKISTAN ” published in “AUTEX Research Journal ” authored by “M. Hashim, M. Nazam, M. Z. U. Rehman, M. Abrar, S. A. Baig, **M. Nazim,** Z. Hussain”
25. **“**Unlocking the Sustainable Production Indicators: A Novel TESCO based Fuzzy AHP Approach ” published in “Cogent Business & Management ” authored by “M. Hashim , M. Nazam , M. Abrar , Z. Hussain , **M. Nazim** & R. Shabbir”
26. **“** Factors Influencing Sustainable Production of Cotton in Pakistan: A Case Study From Bahawalpur District ” published in “International Journal of Sciences: Basic and Applied Research ” authored by “**M. Nazam**”
27. “Does educated labor force is managing the green economy in BRCS? Fresh evidence from NARDL-PMG approach” in “Environmental Science and Pollution Research” authored by “Naseer, S., Song, H., Chupradit, S., **Maqbool, Adnan.,** Hashim, N. A. A. N., & Vu, H. M. (2021).”
28. “The impact of green RHM on employees’ green creativity: A moderated mediation model of green transformational leadership and green perceived organizational support ” in “International Journal of Manpower ” authored by “Hameed, Z., Naeem., Hassan, M., Naeem, Muhammad N., M., & **Maqbool Adnan**.”
29. “Accentuating the Interrelation between Consumer Intention and Healthy Packaged Food Selection during COVID-19: A Case Study of Pakistan.” in “Int. J. Environ. Res. Public Health” authored by “Zafar, M.Z.; **Maqbool, Adnan**; Cioca, L.; Shah, S.G.M.; Masud,”
30. “The nexus of sectoral-based CO2 emissions and fiscal policy instruments in the light of Belt and Road Initiative ” in “Environmental Science and Pollution Research. ” authored by “Muhammad W. A., Peng Y., **Maqbool, Adnan**, Zeenat Z., Muhammad S., ”
31. Exploring the asymmetric effects of renewable energy production, natural resources, and economic progress on CO2 emissions: fresh evidence from Pakistan by Shahid Iqbal, Ying Wang, Parvez Ahmed Shaikh **Adnan Maqbool**, Khizar Hayat in Environmental Science and Pollution Research

32. Analysis of income inequality and environmental pollution in BRICS using fresh asymmetric approach by Waijun Zhao, Muhammad Hafeez, **Adnan Maqbool**, Sana Ullah, Sidra Sohail in Environmental Science and Pollution Research
33. Fundamentals and Design-Led Synthesis of Emulsion-Templated Porous Materials for Environmental Applications
https://onlinelibrary.wiley.com/doi/full/10.1002/advs.202102540
34. Hyperbranched Polyethylenimine-Tethered Multiple Emulsion-Templated Hierarchically Macroporous Poly(acrylic acid)−Al_2O_3 Nanocomposite Beads for Water Purification https://pubs.acs.org/doi/pdf/10.1021/acsami.1c03922
35. Fabrication of Emulsion-Templated Poly(vinylsulfonic acid)−Ag Nanocomposite Beads with Hierarchical Multimodal Porosity for Water Cleanup
https://pubs.acs.org/doi/abs/10.1021/acs.langmuir.9b02518
36. Magnetic Hierarchically Macroporous Emulsion-Templated Poly(acrylic acid)–Iron Oxide Nanocomposite Beads for Water Remediation
https://pubs.acs.org/doi/abs/10.1021/acs.langmuir.9b01121
37. Polyacrylamide exotemplate-assisted synthesis of hierarchically porous nanostructured TiO_2 macrobeads for efficient photodegradation of organic dyes and microbes
https://pubs.rsc.org/en/content/articlelanding/2018/ra/c8ra06197a
38. Development of Silver-Nanoparticle-Decorated Emulsion-Templated Hierarchically Porous Poly(1-vinylimidazole) Beads for Water Treatment
https://pubs.acs.org/doi/10.1021/acsami.7b05311
39. Bioaccumulation of zinc in *Rana tigrina* in different aquatic habitats
https://academicjournals.org/journal/AJB/article-abstract/2DAE31763964#:~:text=tigrina%20from%20sewage%20habitat%20showed,and%20pollution%20of%20aquatic%20ecosystems.
40. Facile Preparation of Fe_3O_4 Nanoparticles/Reduced Graphene Oxide Composite as an Efficient Anode Material for Lithium-Ion Batteries
https://doi.org/10.3390/coatings11070836

41. Carbon nanotubes on highly interconnected carbonized cotton cloth for flexible and light-weight energy storage
https://onlinelibrary.wiley.com/doi/abs/10.1002/adsu.201700022
42. Electrochemical treatment of 2, 4–dichlorophenol using a nanostructured 3D–porous Ti/Sb–SnO2–Gr anode: Reaction kinetics, mechanism, and continuous operation
https://www.sciencedirect.com/science/article/abs/pii/S0045653517310305
43. Achieving high rate and high energy density in an all-solid-state flexible asymmetric pseudocapacitor through the synergistic design of binder-free 3D ZnCo2O4 nano polyhedra and 2D layered Ti3C2Tx-MXenes
https://pubs.rsc.org/en/content/articlelanding/2019/ta/c9ta08227a
44. RuO2 nanorods decorated CNTs grown carbon cloth as a free standing electrode for supercapacitor and lithium ion batteries
https://www.sciencedirect.com/science/article/abs/pii/S0013468619318808
45. Construction of binder-free hierarchical mesoporous 3D Co–Mo–O flowers assembled by nanosheets for aqueous symmetrical 1.2 V supercapacitor in basic electrolyte
https://www.sciencedirect.com/science/article/abs/pii/S0013468619320729
46. Novel gravel-like NiMoO4 nanoparticles on carbon cloth for outstanding supercapacitor applications
https://www.sciencedirect.com/science/article/pii/S0272884219333085
47. High-performance flexible hybrid-supercapacitor enabled by pairing binder-free ultrathin Ni–Co–O nanosheets and metal-organic framework derived N-doped carbon nanosheets
https://www.sciencedirect.com/science/article/abs/pii/S0013468620307763
48. Surface assembly of Fe3O4 nanodiscs embedded in reduced graphene oxide as a high-performance negative electrode for supercapacitors
https://www.sciencedirect.com/science/article/pii/S0272884220312840
49. Insights to pseudocapacitive charge storage of binary metal-oxide nanobelts decorated activated carbon cloth for highly-flexible hybrid-supercapacitors
https://www.sciencedirect.com/science/article/abs/pii/S2352152X20314390

50. High perfromance flexible supercapattery enables by mesoporous ultrathin two-dimensional nickle ferrite nanosheets
https://pubs.rsc.org/en/content/articlelanding/2021/qm/d1qm00109d/unauth
51. Energy storage performance of binder-free ruthenium-oxide nano-needles based free-standing electrode in neutral pH electrolytes
https://www.sciencedirect.com/science/article/abs/pii/S0013468621004291
52. Integrating Adsorption and Photocatalysis: A cost effective Strategy for Textile Wastewater Treatment using Hybrid Biochar-TiO2 Composite
https://doi.org/10.1016/j.jhazmat.2019.121623
53. Macroalgae and coal-based biochar as a sustainable bioresource reuse for treatment of textile wastewater
https://doi.org/10.1007/s13399-019-00555-6
54. Optimization on cleaner intensification of ozone production using Artificial Neural Network and Response Surface Methodology : Parametric and comparative study
https://doi.org/10.1016/j.jclepro.2019.119833
55. Investigating biodiesel production strategies as a sustainable energy resource for Pakistan
https://doi.org/10.1016/j.jclepro.2020.120729
56. Dilute acid hydrolysis of sugar canebagasse using a laboratory twin gear reactor
https://doi.org/10.1016/j.renene.2020.01.122
57. Biorefinery of Microalgae for Nonfuel Products" Microalgae
https://doi.org/10.1016/B978-0-12-817536-1.00013-8
58. Mechanical and Thermal Properties of Montmorillonite-Reinforced Polypropylene/Rice Husk Hybrid Nanocomposites
https://doi.org/10.3390/polym11101557
59. Microalgae-based biofuels, resource recovery and wastewater treatment: A pathway towards sustainable biorefinery
https://doi.org/10.1016/j.fuel.2019.115826
60. Simultaneous production of bioelectricity and biogas from chicken droppings and dairy industry wastewater and employing bioelectrochemical system

https://doi.org/10.1016/j.fuel.2019.115902

61. Stacked Layer Effect of ZnO/TiO_2 on the efficiency of dye sensitized solar cells https://doi.org/10.1166/jno.2019.2493
62. Functional exploration of bioactive moieties of fermented and non fermented soy milk with refernce to nutritional attributes doi: 10.15414/jmbfs.2020.10.1.145-149
63. Solar powered decentralized water systems: A cleaner solution of the industrial wastewater treatment and clean drinking water supply challenges https://doi.org/10.1016/j.jclepro.2020.125717
64. Developing Multiplexed Plasma Micro-Reactor for Ozone Intensification and Wastewater treatment https://doi.org/10.1016/j.cep.2021.108337
65. Intensification of Ozone Generation and Degradation of Azo Dye in Non-Thermal Hybrid Corona-DBD Plasma Micro-Reactor https://doi.org/10.1016/j.cep.2020.108205
66. Synergetic effect of packed-bed corona-DBD plasma micro-reactor and photocatalysis for organic pollutant degradation https://doi.org/10.1016/j.seppur.2021.118728
67. Integrating bioremediation of textile wastewater with biodiesel production using microalgae (Chlorella vulgaris) https://doi.org/10.1016/j.chemosphere.2021.130758
68. Conversion of poultry-fat waste to a sustainable feedstock for biodiesel production via microbubble injection of reagent vapor https://doi.org/10.1016/j.jclepro.2021.127525
69. Castor Leaves-Based Biochar for Adsorption of Safranin from Textile Wastewater https://doi.org/10.3390/su13126926
70. Current developments in esterification reaction: A review on process and parameters https://doi.org/10.1016/j.jiec.2021.07.018

3 MS/ MPhil Thesis

1. Photoelectrochemical Conversion of Carbon Dioxide (CO_2) into Fuels
2. Synthesis of Gossppium Field Biowaste mediated Activated Carbon and its Surface Functionalization using Deep Eutectic Solvent for Environmental Remediation
3. The Synthesis of RGO/Ag_2O Nano-composite for the Pesticide Rectification from Water via Photocatalysis
4. Facile cost-effective Fabrication of Cu_2O based Biochar Composite for Photodegradation of Pharmaceutical Wastewater
5. Study of Advanced Semiconductor Material towards Photocatalytic Degradation of Dyes
6. Photodegradation of Levofloxacin from Wastewater via Cu-doped Vanadium Pentaoxide Photocatalyst
7. Study of Pharmaceutical Micropollutant Degradation using Co-doped CuO2 Photocatalyst
8. Peroxydisulfate based Advanced Oxidation Process for the Treatment of Pharmaceutical Wastewater
9. Synthesis of non-Noble Metal-based Catalyst for Photocatalytic Degrdation of Dyes
10. Photodegradation of Pesticide from Wastewater using Zif-8/TiO_2 based Photocatalyst under Visible Light Irradiation
11. Development Of TiO_2 based Graphitic Carbon Nitride Photocatalyst for the Treatment of Pharmaceutical Pollutant
12. Photo catalytical Treatment of Textile Wastewater using Zif-67/TiO_2/ZnO Photocatalyst
13. Development Of TiO_2 based Graphitic Carbon Nitride Photocatalyst for the Treatment of Pharmaceutical Pollutant
14. Impact of digital transformational and socio technical factors on sustainability of small and medium enterprises in COVID-19, Role of organizational ambidexterity and digital leadership supervised by Dr. Adnan Maqbool
15. MS Thesis of Muhammad Umer Munir “Assessing the developmental factors affecting CO2 emissions in Pakistan” supervised by Dr. Adnan Maqbool

16. MS Thesis of Mariam Tarique supervised by Young Consumers Purchasing Behavior Towards Organic Food Environmental Attitude V/S Health Attitude supervised by Dr. Sidra Ghazanfar

4 Final Year Projects

1. Experimental Investigation of Fuel in Diesel Engine
2. Study of wear characteristics of fuel
3. Design and fabrication of vertical axis wind turbine
4. Design and Fabrication of Multipurpose Agriculture machine
5. Design and fabrication of solar car: Aerodynamic and chassis design
6. Design and fabrication of solar car: Suspension, controlling and power transmission
7. Design and fabrication of regenerative braking system of solar car
8. Development and analysis of Solar Dryer
9. Indirect Evaporative Cooler
10. Steam Generation through Solar Radiation by Optimizing Collector Design
11. Design, Fabrication and Analysis of a Solar Thermal Based Water Desalination System
12. Design and Fabrication of Cross Flow Micro Hydro Turbine
13. Design, Analysis and fabrication of bio gas plant
14. Design and Fabrication of Blade less wind mill
15. Development and Application of IoT based Irrigation system operation

5 NRPU Projects

5.1 Investigation of Fouling Mechanism of Reverse Osmosis Polyamide Membranes Using Molecular Dynamics Simulation

Funding Amount: Rs. 6,233,000/=

Summary:

The objectives of this projected include: (1) development of a successful membrane model and (2) study of the membrane fouling mechanism. In this project, it is being hypothesized that MD simulations can build successful membrane model that can be validated through experimental data. A preliminary work of membrane synthesis in this respect has already been completed and future works include the membrane hydration and validation of membrane model through experimental data will be a part of the project. Membrane models with different force field parameter sets and charge schemes will be built and validated. The second hypothesis of the project is the study of investigation of membrane fouling mechanism using MD simulations. The membrane models will be used to investigate the membrane fouling mechanism. Free energy profiles of ions (Na^+ and Cl^-) and water models, ion-ion, and ion-membrane interactions will be analyzed to understand fouling phenomena. The water and ion permeation the across membranes of varying degree of cross-links will be studied to study the effect of degree of cross-links on permeation. To accomplish the two parts of the project (development of membrane model and its utilization to study fouling mechanism), a small software package will be written in house that will be made available to the academia and industry free of charge. This contribution to academia and industry will enable academia to study different features of RO process and industry to fabricate RO module with membranes of specified degree of cross-linking at specified locations to optimize the industrial process. Both (academia and industry) will also be able to study fouling mechanisms of different surface modified membranes.

Pictorial Evidence:

5.2 Synthesis and characterization of Anion Exchange Membrane for fuel cell application

Funding Amount: Rs. 4247250/=

Summary:

The novel method of using alkaline anion-exchange membranes (AEMs) in alkaline membrane fuel cells (AMFCs) has the potential to overcome some of the problems confronting other approaches to low temperature fuel cells, such as high catalyst and fuel costs. Thus, the shift to alkaline conditions at the electrodes allows for the use of a variety of low-cost non-precious-metal catalysts rather than the otherwise necessary use of platinum-group-metal (PGM)-based catalysts. Furthermore, hydrogen fuels containing significant quantities of impurities may be considered, whereas an acidic membrane solution (as used in proton exchange membrane fuel cells, PEMFCs) includes high purity PGM catalyst and gases.

The structures of polymer electrolyte membrane fuel cells (PEMFCs) and AEMFCs are similar. The AEMFCs have an alkaline polymer electrolyte membrane (called AEM or AAEM) that can conduct OH– anions, while the PEMFCs have an acidic polymer electrolyte membrane (PEM) that can conduct H+ protons. PEMFCs have been extensively researched in recent years, but durability and cost remain two major challenges impeding their global commercialization. As a result of these challenges, alkaline anion-exchange membrane fuel cells are gaining popularity because they have the potential to outperform polymer electrolyte membrane fuel

cells in terms of efficiency. The primary benefits are that it allows for non-precious catalyst, increased electrocatalytic action in alkaline conditions, more fuel options in simple environments (ammonia, borohydride), and lower fuel crossover rates/potentially improved water.

The first paper on AMFC was published in 2005, and since then, his area has piqued the interest of researchers. Alkaline fuel cells outperform all other traditional hydrogen–oxygen fuel cells that can operate at temperatures below 200 0C. Because of the simple kinetics at the cathode and anode, less expensive non-noble metal catalysts can be used.

Pictorial Evidence:

5.3 Synthesis and Evaluation of Non-Noble Metal Based Carbon supported Nanostructures towards Electrocatalytic Energy Conversion Applications

Funding Amount: Rs. 15655500-/

Summary:

In order to achieve the clean and sustainable energy route for the hydrogen economy, the development of more efficient, easily available and non-noble metal free transition metal-based catalysts toward overall water splitting at low over potential is always remain a highly desirable. Currently, the main focus of scientific community is to design an environmentally friendly and efficient noble metal free electrocatalysts (carbides, borides, nitrides, layered double hydroxides, oxides, phosphides, sulfides and selenides etc.) towards HER, OER and ORR energy conversion applications. However, in this current proposed research work, noble metal

free electrocatalysts supported on carbon-based materials will be synthesized via facile, simple co-precipitation, hydrothermal, solvothermal, chemical reduction and pyrolysis (for carbon-based materials i.e., MOF derived carbon, rGO and Mxene etc.) methods, which will be more valuable approaches in order to synthesize the highly efficient and cost-effective materials towards overall electrocatalytic applications. For that purpose, a series of materials characterization experiments using XRD, SEM, TEM and XPS will be carried out with the aim of evaluating crystallographic structure, morphological features and chemical states of the as-synthesized heterostructures. At the end, all electrochemical experimental measurements for OER, HER and ORR will be thoroughly conducted on an electrochemical workstation for the as-synthesized electrocatalysts.

Pictorial Evidence:

6 SRGP Project

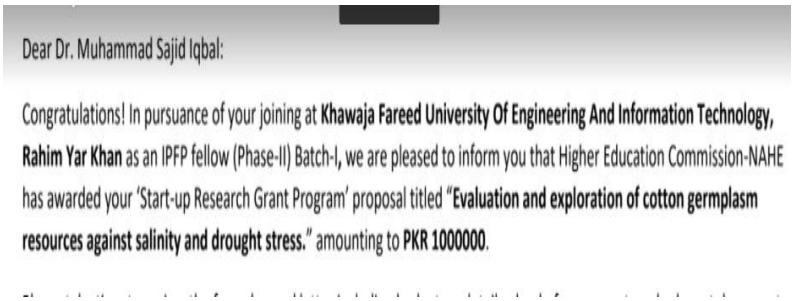
6.1 Evaluation and exploration of cotton germplasm resources against salinity and drought stress.

Funding Amount: 1 Million

Summary:

- Tolerant genotypes will be identified and recommended for cultivation under dry and saline climatic condition of Punjab, Pakistan.
- Farmers will adopt and cultivate these genotypes and will get more earning through sustainable cotton production.
- However, to come up with complete package of practices in different locations; information on planting methodology, environmental influences (drought, heat, cold and salinity), fertilizer, irrigation, pesticides and cultural practices of economic viability will be furnished.
- Lead by Dr. Muhammad Sajid Iqbal

Pictorial Evidence:



Dear Dr. Muhammad Sajid Iqbal:

Congratulations! In pursuance of your joining at **Khawaja Fareed University Of Engineering And Information Technology, Rahim Yar Khan** as an IPFP fellow (Phase-II) Batch-I, we are pleased to inform you that Higher Education Commission-NAHE has awarded your 'Start-up Research Grant Program' proposal titled "**Evaluation and exploration of cotton germplasm resources against salinity and drought stress.**" amounting to **PKR 1000000**.

7 Newspaper Articles/ Blogs / Magazine

1. Issuance of digital magazine named as “environmental activist” working as editior by Dr. Muhammad Asad

   A Magazine named as “Environment Activist” working under the “Insaniat Writers forum”, was started about 6 months ago. This magazine published many articles from all around the country related to environmental Changes. Dr. Muhammad Asad is working as Editor of this Magazine and Miss Sidra Sarwar (Environmental sSciences, A Student from GC Women's University Sialkot) is working as an incharge of this magazine. Three issues of this magazine are published till now.

Figure 26: Environment Activist Magazine

Reference:

The name of magazine is registered on www.insaniatmagazine.com.

2. A series of posters to aware public on different issues related to biodiversity: In Winter vacations, students created posters for awareness on Extinct and Newly discovered plants and animals species in which we describe their habitats, Reasons of extinction of species and how we can take protective measures.

Figure 27: Awareness Poster on Endangered Specie

8 Seminar/ Webinar/ Training/ Workshop/ Awareness Walk

1. A seminar was conducted “What dead animals creating hazard in our environment if not buried or dispose off” on 3rd December 2021. The purpose of this seminar was to aware that Dead animals are threat to public health because of intolerable odors and the potential spread of disease such as Salmonellosis, Campylobacter, Clostridium and other zoonotic diseases. And how we can control it.

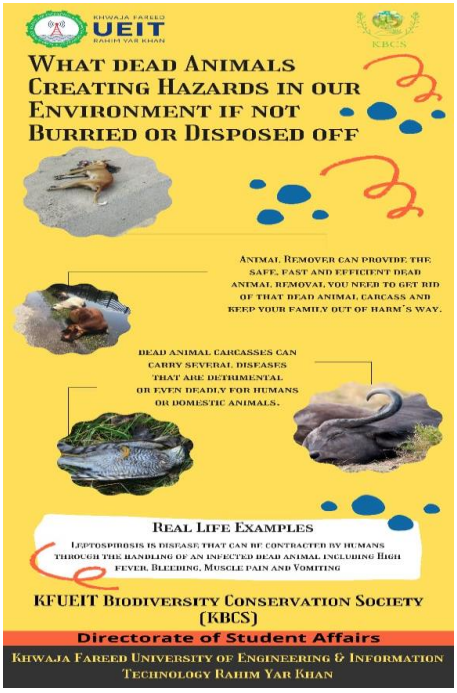


Figure 28: Seminar on Dead Animals Creating Hazard

2. A Webinar was arranged by the Department of life sciences on 28 January 2021. The topic of the webinar was “Plant Diversity and Natural Resources of Pakistani Desert”.

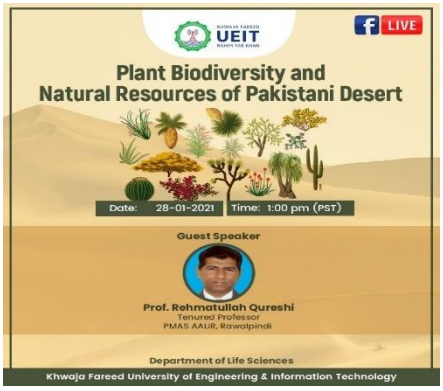


Figure 29: Webinar on Plant Diversity and Natural Resources of Pakistani Desert

3. A hands-on training on “Recycling Program for University Waste” was arranged on 19th June 2021.

Figure 30: Recycling Workshop

4. A seminar on “Reduction of Carbon Emission” was conducted on 19th June 2021.

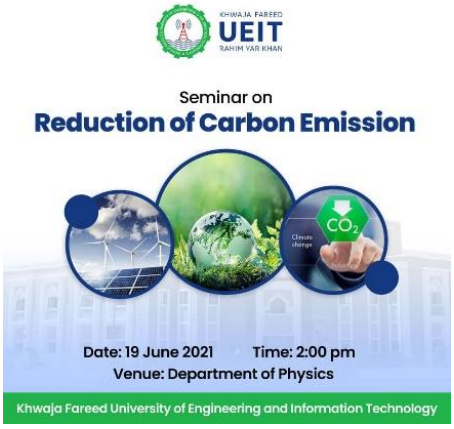


Figure 31: Seminar on Reduction of Carbon Emissions

5. A workshop on “Reduction of Paper and Plastic on Campus” was held on 20th June 2021.

Figure 32: Webinar on Reduction of Paper and Plastic on Campus

6. A seminar was held on “Sustainability and Global Warming” on 20th June 2021.

Figure 33: Seminar on Sustainability and Global Warming

7. A workshop was arranged on “Application of Google Earth Engine in Water Management and Role of Telemetry in Water Accounting”. The training was aimed at the capacity building of students and faculty members to use the latest tools and technologies to make them familiar on the precision surface irrigation for efficient use of solar water tubewells.

8. A two-day webinar was planned on “Design of Solar Pumped irrigated field through Precision Surface Irrigation System using WinSRFR Model”

9. Hands on training for operation and maintenance of solar irrigation system

10. An awareness walk was organized by the Directorate of Student Affairs under the Clean and Green Campaign.

Figure 34: Awareness Walk Under the Clean and Green Campaign

9 Plantation Drive

The University faculty, staff and students participated in the Plantation Drive and planted more than 50,000 new fruit and shade trees.

Figure 35: Plantation Drive

10 Future Plans

- New processes and technologies may be adopted/developed for the recycling of different types of wastages in the university and surrounding community areas.
- Environmental Policy of the University needs to be developed by keeping in view the guidelines developed by the Paris Agreement* and UNFCCC**.
- Improvement in LMS and MIS are required to further enhance its efficiency and useability.
- Duties, vision, mission, and goals of the Plantation Committee need to be clearly defined and communicated with interested parties.
- Develop and implement a Safety Management System for students, faculty, staff, and surroundings.
- Horticulture Society needs to be started with structure and responsibilities.
- Establish and implement a procedure to deal with natural calamities and diseases Covid-19 pandemic.
- Source all electricity the university consumes at its facilities from renewable sources – such as wind, solar or hydro – or install renewable energy generation capacity on-site.
- Retrofit the lighting systems of the company's facilities to energy-efficient LED lighting**.**
- Increase investment in innovation to improve the efficiency of the company's product portfolio, thereby enabling customers to reduce their Green Housed Gases (GHG) emissions.
- Invest in CCS (Carbon Capture & Storage) technology to capture emissions produced from the use of fossil fuels in electricity generation and industrial processes, preventing carbon dioxide from entering the atmosphere.
- Reduce GHG emission from transport operations with abatement levers such as reducing the carbon footprint through greater fuel efficiency, local sourcing, modal shift to lower carbon modalities (e.g., air to sea freight), modular transport, improving container utilization, warehouse optimization, etc.
- Understand climate risk and build resilience into the company's assets and supply chain.
- Expand sustainable forest management through responsible sourcing practices and product substitution.
- We have to train our students, staff and faculty on the following protocols:

- Always switch off lights when you leave a room
- Take shorter showers
- Use the timer so the heating only comes on when you really need it
- Invest in some low-cost energy-saving lightbulbs
- When using the kettle, only boil as much water as you need
- Layer up your clothes so you can protect yourself from cold without using heaters

** Switching fuels to renewable energy and enhancing end-use energy efficiency.*

***United Nations Framework Convention on Climate Change (UNFCCC)*