Agro-Pathology Bulletin

A Biannual Newsletter by Department of Plant Pathology, University of the Punjab

Vol-1, 2022 (Issue I and II)

From the Director

Welcome to the Agro-Pathology Bulletin. As the Dean, Faculty of Agricultural Sciences (FAS), University of the Punjab (PU), I am honored to present you the first edition of our newsletter from department of Plant Pathology, DPP. This newsletter will provide information on our latest research projects, news and events, and resources for scientists, farmers and growers in agricultural sector.

With great enthusiasm, my team in Department of Plant pathology has been keeping a close eye on the latest developments in agriculture, and we are humbled to share with you some exciting updates on new technologies, innovative practices, and cutting-edge research that are helping farmers increase their yields and produce more sustainably. I appreciate the efforts of Prof. Dr. Tehmina Anjum, (Chairperson) for her tremendous efforts in progress of this Department. Our mission is to advance the field of plant protection through front-line research and applicable solutions, and this newsletter is an important platform for sharing our work with the world.

At FAS, we are committed to promoting global food security and agricultural trade, and this newsletter is just one of the many ways we strive to achieve this goal. We hope this newsletter will be a valuable resource for all our readers and help you stay informed and up-to-date on the latest agricultural sector developments.

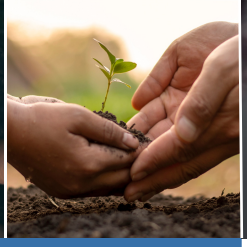
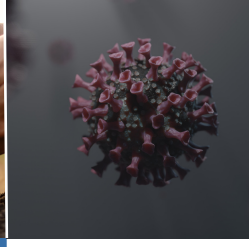
We also invite you to join our community and engage with us on social media to stay current on the latest plant protection/pathology developments.

Thank you for reading our newsletter, and we look forward to sharing our passion for plant protection with you.

Sincerely

Prof. Dr. M.Saleem Haider

(Dean-FAS)

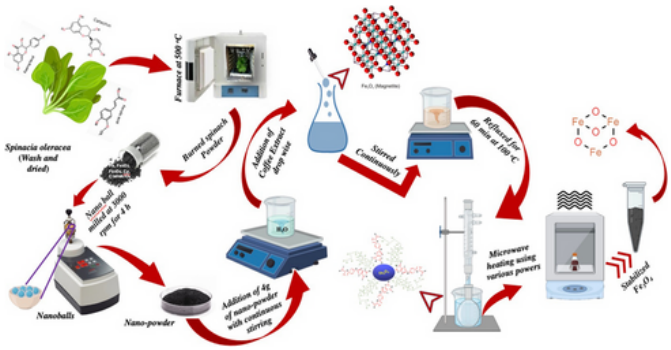
NEWS

Revolutionizing Agriculture with Green Nanotechnology: Enhancing Tomato Resistance to Fungal Wilt

Nanomaterials based on nanotechnology have become an essential tool for sustainable agricultural development and play an integral function in plant protection. We in the department of Plant Pathology have been working on green nanotechnology for the last seven years.

Recently various microwave powers (100-1000 W) were used to modulate the properties of the green-synthesized IONPs, using spinach as a starting material. The IONPs stabilized with black coffee extract were substantively characterized using X-ray diffraction analysis (XRD), Fourier-transform infrared spectroscopy, dielectric and impedance spectroscopy, X-ray photoelectron spectroscopy (XPS), scanning and transmission electron microscopy (SEM and TEM, respectively), and magnetization analysis. In vitro and in-greenhouse studies were conducted to evaluate the potential of green-synthesized iron-oxide nanoparticles (IONPs) in suppressing wilt infection caused by Fusarium oxysporum *f. sp.* lycospersici and improving tomato growth (*Solanum lycopersicum)* and fruit quality.

Analysis of photosynthetic pigments, phenolic compounds, and antioxidant enzymes in the roots and shoots showed an increasing trend after exposure to various concentrations of IONPs. Correspondingly, lycopene, vitamin C, total flavonoids, and protein content were substantially improved in tomato fruits after treatment with IONPs. This project was completed with the collaboration of Dr. Saira Riaz and her team at the Centre of Excellence in Solid-State-Physics, University of the Punjab, Lahore, Pakistan.



Schematic showing green synthesis of IONPs using spinach and black coffee extract by varying microwave powers (100–1000 W)

Dr.Hina Ashraf, Tehmina Anjum, Saira Riaz, Tanzeela Batool, Shahzad Naseem and Guihua Li. 2022. Sustainable synthesis of microwave-assisted IONPs by using Spinacia Oleracea: enhances resistance against fungal wilt infection by inducing ROS and modulating defense system in tomato plants. Journal of Nanobiotechnology. 20:8. https://doi.org/10.1186/s12951-021-01204-9 (IF: 10.435)

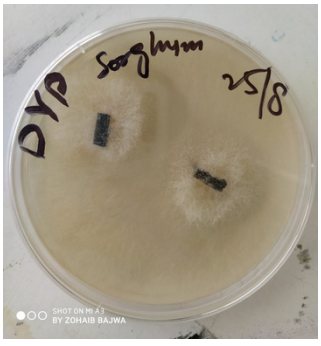
For more info contact Prof.Dr.Tehmina Anjum (Chairperson-DPP)

Fighting Fungal Diseases in Sorghum: The First Fungal Culture Bank of Pakistan Identifies *Colletotrichum graminicola* as the Sorghum Pathogen

In August 2022, the First Fungal Culture Bank of Pakistan (FCBP) received diseased samples of Sorghum from Pest Warning and Quality Control. The samples received showed severe red rot symptoms on the stem leading to red steaks on leaves.

The diseased samples proceeded to isolate and identify the causal organisms in FCBP, Department of Plant Pathology, University of the Punjab, Lahore, Pakistan. Diseased samples were inoculated on MEA, SDAY, and PDA media under different incubation temperatures. It was concluded from the isolation, followed by morphological identification, that this disease's causal organism is Colletotrichum graminicola.

The isolated fungus has been preserved in the conservatory for reference culture under Accession no. FCBP-PTF- 1548. Symptomatically, Anthracnose Red rot of Sorghum disease shows a similar visual appearance as verified by literature, and its causal organism, Colletotrichum graminicola, is already reported from different regions of the world. It is verified that the submitted disease samples were infected with Anthracnose Red rot of Sorghum disease caused by *Colletotrichum graminicola.* Further studies regarding the virulence of the pathogen against different varieties of Sorghum are in process. The culture of Colletotrichum graminicola FCBP-PTF- 1548 is available in FCBP for research purposes.



For more info contact Dr. Uzma Bashir(Asst.Prof-DPP)

Unlocking the Power of Biochar: An Emerging Solution to Agricultural

Human activities of ancient Amazonian civilizations about 7000 years ago established highly fertile pieces of land. These pre-Columbian soils are called terra preta or black earth because of the intentional deposition of organic waste and charcoal. Soil analysis revealed that these sites contain 70 % more carbon and three times more organic matter than surrounding soils. These soils were rediscovered in the early 19th century, but it is only in been last decade and a half that studies have been initiated to explore the characteristics of such soils and the mechanism behind plant growth improvement.

Biochar is a porous pyrolytic coproduct of biomass. Pyrolysis is a heating process of various organic wastes at a temperature range of 200 °C to 900 °C without air or oxygen. According to the International Biochar Initiative, “a solid material obtained from the thermochemical conversion of biomass in an oxygen-limited environment” is known as biochar. The physicochemical properties of biochar, such as pH, water holding capacity, nutrient status, biochar-borne hormones, toxins, and adsorption of fungal and bacterial toxins on biochar surface, has a significant impact on plant-microbe interaction at below and above ground level.

The benefits associated with biochar addition to the soil includes reduced leaching of nitrogen into groundwater, possible reduced emissions of nitrous oxide, increased cation exchange capacity resulting in improved soil fertility, moderation of soil acidity, increased water retention, and increased number of beneficial soil microbes. Biochar remains in the soil, and single applications provide benefits over many years. In many regions, soil loss and degradation are occurring at unprecedented rates. Loss in soil productivity occurs despite the intensive use of agrochemicals, coinciding with adverse environmental impacts on soil and water resources.

Biochar application can significantly suppress the infectivity potential of plant pathogens and also improves plants' physiology. The interactions between plant pathogens and biochars are also of great interest from economic and environmental points of view. By adopting soil management strategies, farmers can significantly reduce disease losses while eliminating the use of pesticides.

In addition to that, biochar application helps in combating drought and salt stress and plays its role in environmental protection through carbon sequestration and sustainable food production to meet the needs of the growing world population as Pakistan is facing Smog issues due to the burning of rice stubbles in the Punjab province on both sides of the International borders (India and Pakistan). Due to this, the air quality is deteriorating and negatively affecting Human and Plant Health.

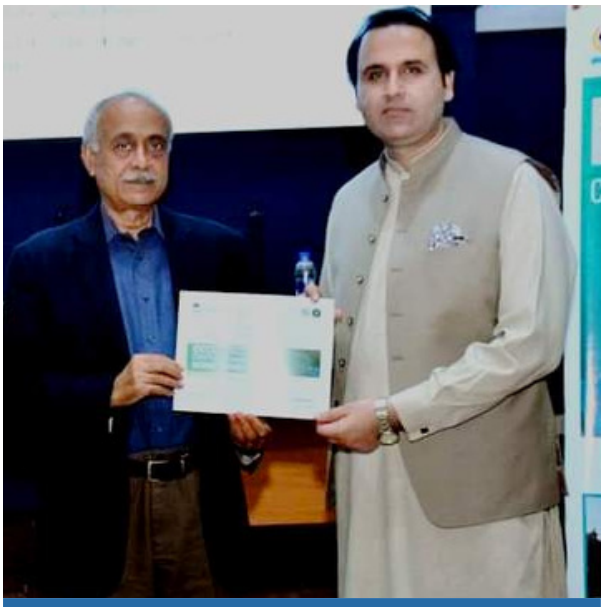
Therefore, converting rice stubbles or other organic wastes into Biochar will be an excellent and environment-friendly strategy to overcome pollution hazards. Furthermore, studies must be designed to explore the full potential of biochar against economically important pathosystems under field conditions. Over the coming years, biochar's impact on the rhizosphere-associated microbial communities is anticipated to open a novel era of plant diseases and soil management.

A Hands-on Journey through the 2nd National CRISPR/CAS Training

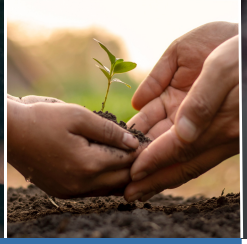
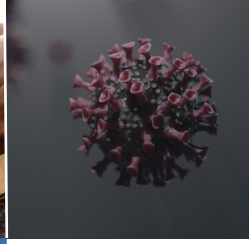
CRISPR/CAS Mediated Genome Editing was organized by National Center for Genome Editing (NCGE), Center for Advanced Studies in Agriculture and Food Security (CAS-AFS), at the University of Agriculture, Faisalabad on 23rd May and it continued till 27th May.

The training was designed to provide a hands-on experience for researchers, students, and professionals who were interested in unlocking the power of genome editing to prevent plant diseases and losses caused due to it. The main objective of the training was to find new and innovative ways to use CRISPR/CAS in research and create a platform for future planning and collaboration between scientists and institutions.

Dr. Adnan Akhter (Assistant Professor) and Dr. Waheed Akram (Assistant Professor) participated in this training from our Department of Plant Pathology. The training was designed to provide a hands-on experience for researchers, students, and professionals who were interested in unlocking the power of genome editing to prevent plant diseases and losses caused due to it. The main objective of the training was to find new and innovative ways to use CRISPR/CAS in research and create a platform for future planning and collaboration between scientists and institutions.



Dr. Adnan Akhtar at the 2nd National CRISPR/CAS Training at the University of Agriculture, Faisalabad

NEWS

Winning Tactics for Exploiting Sustainable Sources for Bio-Active Compounds in Agriculture

Prof. Dr. Tehmina Anjum, Chairperson Department of Plant Pathology, Faculty of Agricultural Sciences, Punjab University, was invited as Keynote speaker at the 1st International Conference on Sustainable Development Goals by Lahore College for Women University, Lahore, on 30th March 2022. Dr. Anjum gave a talk on "Exploiting sustainable sources for bio-active compounds in agriculture" that covered her main research projects completed in sustainable agriculture. She shared her experience in Allelopathy, systemic resistance, active packaging, and green nanotechnology.

The Conventional Guide to Pest Warning and Quality Control of Pesticides

Directorate General Agriculture, Pest Warning and Quality Control of Pesticides, Punjab, arranged a consultative session to develop the IPM program in rice and vegetables on 27th Oct 2022. DG Pest Warning and Quality Control of Pesticides, Punjab, Dr. Faqir Ahmad chaired the meeting. Prof. Dr. Tehmina Anjum, Chairperson Department of Plant Pathology, Faculty of Agricultural Sciences, Punjab University, represented the Department of Plant Pathology PU in this session. The experts showed concern about the Maximum Residue Levels (MRLs) of pesticides beyond permissible levels on rice that is causing a major threat to the export competitiveness of Pakistani rice in major global markets such as the United States, European Union (EU), and the Middle East. Hence various IPM strategies were discussed in the meeting, and a working paper was finalized.

An Eye Into the Future Through New Innovation

Punjab Higher Education Commission (PHEC) and its cohost partners organized "All Punjab Universities Innovation Expo-2022" at Faletti's hotel, Lahore, on 15th November 2022. The main objective of this expo was to offer a platform for university teachers and students to showcase the projects/start-ups, thus promoting innovation and entrepreneurship with a focus on product development and commercialization.

It also allowed participating universities to excel through healthy competition among faculty/graduates by exhibiting their respective projects. Prof. Dr. Tehmina Anjum, Chairperson-DPP, evaluated projects under the Agriculture and Veterinary Sciences category. Dr. Anjum appreciated the efforts of Chairperson Punjab Higher Education Commission Prof. Dr. Shahid Munir and his team for arranging a successful event

A session chaired at International Conference on Current and Innovative Trends in Applied Biosciences

An International Conference on Current and Innovative Trends in Applied Biosciences was organized by the Department of Biology, Lahore Garrison University, Lahore, on 21 – 22 November 2022. Prof. Dr. Tehmina Anjum, Chairperson Department of Plant Pathology, Faculty of Agricultural Sciences, Punjab University, was invited to chair a session. Researchers from Punjab and KPK participated and presented their research findings. At the end of the session, shields and certificates were distributed among the speakers.

Recruitment Drives for the students

Department of Plant Pathology Placement Bureau arranged the following four recruitment drives in the Faculty of Agricultural Sciences in 2022. Fresh graduates of the faculty of Agricultural Sciences PU and other agri universities actively participated in these sessions.

1. Walk-in interviews scheduled for Agriculture officers and Field Assistants by HBL for Sahiwal Division on Thursday, 24th Feb 2022.
2. Written test and interviews against vacant Territory Manager positions (Male) on 16th March 2022. The activity was conducted by Mr Muhammad Rafiq Bhatti, National Sales Manager – SPT FMC.
3. Written test on 8thth June 2022 for the Assistant Territory Manager (Male) recruitment process. Activity conducted by Mr Usman Malik, Assistant Development Manager – Evyol Group.
4. Walk-in interviews for Female Human Resources of Agri Graduates (External Communication and Media officer + Sustainability officer) for Galaxy Rice Pakistan on 29th Dec. 2022.

Steps taken for Positive future outcome

WAPRO partners (Helvetas, Better Cotton Initiative, Rice Partners Limited, Galaxy Rice Mills) jointly organized a learning and sharing event on 20th Dec. 2022 at Falletis Hotel, Lahore to exchange on experiences of WAPRO in Pakistan. This served as an opportunity to identify priorities in the sector to inform future actions. Decision makers, researchers, and practitioners brought their experience together to discuss success and failure of WAPRO in promoting water efficiency as a business case while zooming on leveraging technology for water productivity. Department of Plant Pathology, University of the Punjab was represented by the Chairperson, Prof. Dr. Tehmina Anjum. Services and collaboration of the Department of Plant Pathology in future endeavors of WAPRO was ensured.

Antifungal Potential of Essential Oils for the Management of Early Blight of Potato (*Alternaria solani* L.) in the First International Conference on Plant Protection (1st ICPP-2022)

Muhammad Nasir Subhani(Associate Professor) orally presented research papers titled: Antifungal Potential of Essential Oils for the Management of Early Blight of Potato (Alternaria solani L.) in the First International Conference on Plant Protection (1st ICPP-2022), December 5-7, 2022, Sultan Qaboos University, Muscat, Oman.This conferences emphasized on the need to develop innovative methods in plant pest and disease management.A vast majority of topics relevant to discoveries and developments in field of plant pathology such as pathogen discovery, insect taxonomy, diagnostics tools, host-pathogen interactions, genomics, and transcriptomic studies we the major themes of this event.

13th Arab Congress of Plant Protection (ACPP-2022), 16- 21 October, 2022, Hammamet-Tunisia

Dr. Nasir subhani Attended and delivered an oraln presentation research paper in Conference, 13th Arab Congress of Plant Protection (ACPP-2022), 16- 21 October, 2022, Hammamet-Tunisia.His Paper was titled as “Biodiversity of Penicillium isolates in Pakistan”.

Dr.Nasir Subhani at the 13th Arab Congress of Plant Protection (Tunisia)

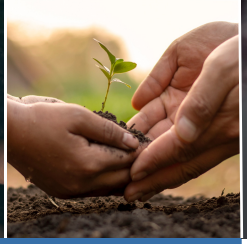
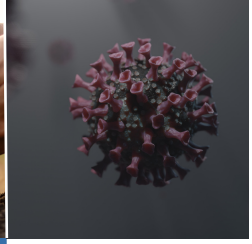
Training Seminar on “How to Improve and Implement Hec-Qaa Parameters for QEC Focal Person, 3rd March 2022, by Quality Enhancement Cell (QEC), University Of Punjab, Lahore

The Quality Enhancement Cell (QEC) of the University of Punjab, Lahore, conducted a training seminar on March 3, 2022, entitled "How to Improve and Implement Hec-Qaa Parameters." The seminar aimed to equip QEC focal persons with the necessary skills to enhance the quality of education in their institutions.

Chairperson of DPP Dr.Tehmina Anjum, who gained valuable insights on the latest approaches and best practices for implementing HEC-QAA parameters. The seminar proved to be an excellent opportunity for professionals in the education sector to network and exchange ideas to improve the quality of education in Pakistan.

Potential techniques of essential oil to combat with early Blight of potato

On December 5-7, 2022, at Sultan Qaboos University, Muscat, Oman, the First International Conference on Plant Protection (1st ICPP-2022) was held. The honorable Dr. Muhammad Nasir Subhani(Associate Professor)attended the meeting representing the University Of Punjab, Pakistan.
They presented the Antifungal Potential of Essential Oils for the Management of Early Blight of Potatoes *(Alternaria solani* L.*)* and enlightened us on how essential oils can play a major role in controlling Early Blight of potatoes and how to overcome this disease in the future. They explained that carnation oil had the strongest and most extensive inhibitory effect on fungal growth. Slightly less effective were caraway and thyme oils, followed by the chemical fungicide. Extended field trials for two cultivation seasons proved that applying essential oils twice as foliar spray had a superior effect to the fungicide treatment for reducing the early blight incidence compared with untreated control.

17th Weed Science Conference

Faculty of Agricultural Sciences, University of the Punjab, Lahore hosted "17th National Weed Science Conference" of Weed Science Society of Pakistan. The theme of the conference was "Food Security through sustainable vegetation management". Prof. Dr. Saleem Haider, Dean, Faculty of Agricultural Sciences, welcomed all the worthy guests and highlighted the importance of weed management and its control in Agriculture sector of Pakistan. He was also presented a lifetime achievement award for his appreciable services in this field. Dr. Tehmina Anjum (Chairperson, Department of Plant pathology presented a souvenir to Chief organizer of this conference, Dr. Muhammad Ishfaq Khan (Associate Professor/Managing Editor).
Prof. Dr Arshad Javed (Vice-President, Weed science Society of Pakistan) of Department of Plant Pathology was also among the organizers of this conference. He presented a paper titled "Herbicidal activity of metabolites of Penicillium species against Parthenium weed and identification of possible herbicidal compounds". He received a Life-Time Achievement Award by the Society in recognition of his research work and services in this field.

The Chief Guest, Chairman, PHEC, Prof. Dr. Shahid Munir appreciated the efforts of this society. President of the weed science society of Pakistan, Prof. Dr. Khan Bahadur Marwat elaborated the role of this society by discussing its progress and endorsed the role of weeds in economic crops along with utilization of their potential in the modern world. All the faculty members and students of Department of plant pathology actively participated in this conference. According to one estimate Weed-inflicted yield losses in Pakistan are around ~ 3 billion US$ annually. Weed scientists from all over Pakistan discussed many strategies related to control and eradication of weeds in all agricultural crops. It was highlighted that weeds are a global threat to agriculture and the economy of farmers so their eradication from fields in an effective way is imperative. New methods for killing the weeds and their role in environment sustainability were also part of the discussion in this conference.

9th National Conference"Biodiversity, Climate Change and Carbon Sequestration,Baragali Conference"

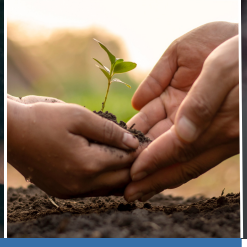
Prof.Arshad Javaid presented the paper entitled "Diversity of antifungal phytochemicals in quinoa (Chenopodium quinoa Willd.) roots against Macrophomina phaseolina" in the 9th National Conference "Biodiversity, Climate Change and Carbon Sequestration", held at Baragali Summer Campus, University of Peshawar, Pakistan during June 21-23, 2022.

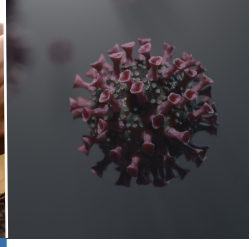
The 1st International Conference on Sustainable Development Goals,Lahore College for Women University

Dr. Arshad Javaid a paper entitled "Use of natural antifungal compounds of Datura metel for sustainable management of collar rot of bell pepper" as an Invited Speaker and also chaired a session in The 1st International Conference on Sustainable Development Goals, held on March 29-31, 2022 at Lahore College for Women University, Lahore
Dr. Arshad Javaid

Photo Gallery

Glimpses of 17th Weed Science





DPP TechnoSpark 2022: A training event for self development, Career Counselling and fundraising for flood victims of Balochistan

DPP TechnoSpark, a one-of-a-kind career development event, was recently organised by Prof. Dr. Tehmina Anjum (Patron in Chief), Dr. Sana Hanif (Chief Organizer) (Assistant Professor), and Mrs. Mehreen Hassan (Chief Organizer) (Lecturer, FAS). Dr. Mudasser Azam (Assistant Professor, ICET was invited as a trainer for this event who has a tremendous experience in conducting such event and job drives.

The event was designed to help individuals discover their strengths, weaknesses, passions, and career objectives and to provide them with the necessary tools to achieve their goals. It was not just another boring workshop but a fun-filled day that includedconfidence boosting games, activities, and interactive sessions on making an effective CV and job winning interview skills. Participants were engaged in team-building activities, which helped them enhance their communication, leadership, and problem-solving skills. They were also encouraged to explore their creativity through various activities.

The event was divided into different sessions, each focusing on a specific aspect of career development. In the first session, Engr Dr. Mudasser Azam talked about the importance of finding one's passion and how it can lead to a fulfilling career. He emphasized that passion is the driving force behind every successful career and that finding what makes you happy is essential. The second session focused on identifying one's drawbacks and weaknesses. Engr Dr. Mudasser Azam discussed how acknowledging one's weaknesses is the first step towards improving them. He encouraged participants to work on their weaknesses and turn them into strengths.

The third session was about setting career objectives. Engr Dr. Mudasser Azam explained the importance of having clear career objectives and how they can help individuals achieve their goals. He also provided tips on how to set SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) objectives.

The main purpose of TechnoSpark was not only to inculcate the essentials skills in the students to be successful in the job market but to also teach them the importance of sense of society and being active part of it. The target was successfully achieved and an amount of 55K was also raised and donated to flood victims of Quetta, Balochistan.

Organizers of the Event (from R-L)
Prof. Dr. Tehmina Anjum (chairperson);
Dr. Sana Hanif (Assistant Professor);
Mrs. Mehreen Hassan (Lecturer)

Photo Gallery

Glimpse of Technospark

Photo Gallery

Glimpse of Technospark

Photo Gallery

Glimpse of Technospark

Members of student organizing committee(OCs)

Participants of the event while performing a task assigned by the trainer