BOOK OF ABSTRACTS

RSO-21st Century
2023

2ND INTERNATIONAL CONFERENCE
OF SCIENCES

REVAMPED SCIENTIFIC OUTLOOK OF 21ST CENTURY

15th Nov 2023

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Vice Chancellor
Rawalpindi Women University

2nd International Conference of Sciences "Revamped Scientific Outlook of 21st Century, 2023" (RSO-21st Century)

November 15th, 2023

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2nd International Conference of Sciences
"Revamped Scientific Outlook of 21st Century, 2023"
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About the Conference

RSO-21st Century is organized every year at Rawalpindi Women University. This year's 2nd International Conference of sciences is being organized to recognize the rapid pace of technological advancements, globalization, and societal changes that have transformed the landscape of science, requiring a fresh perspective to tackle complex challenges including combating with infectious diseases, climate change and its global impact. RSO-21st Century recognizes the multidisciplinary nature of science, as today's complex problems require integrated approach and insights from multiple disciplines of science including Botany, Chemistry, Zoology, Physics, Mathematics, and Statistics. Therefore, this platform invites scientists, researchers, industry experts, academicians, and policy makers to develop a shared understanding of the revamped scientific outlook that encompasses the interdisciplinary nature of modern science and fosters innovation, collaboration, and social impact.

This platform provides a comprehensive approach that integrates multiple insights from diverse fields. Rawalpindi Women University is embracing this approach to foster collaborations and develop holistic and sustainable solutions of this century. Hence, this conference welcomes all stakeholders from different disciplines and walks of life to come together to exchange ideas, share knowledge, and work towards common goals including translating scientific knowledge to practical implications that benefits the society at large.

Message of the Chief Organizer

The current geopolitical and socio-economic challenges require interdisciplinary collaboration. Keeping this in view, Rawalpindi Women University is proud to be the torchbearer in organizing series of multidisciplinary science conference annually. As Chief organizer of the conference, I acknowledge the profound need of innovative solutions of modern-day challenges which can only be resolved through collective efforts. Additionally, at RWU, we firmly believe that scientific conferences play a vital role in advancing human knowledge and providing innovative solutions to complex challenges. Therefore, along with Botany, Chemistry, Mathematics, and Zoology, this year's multidisciplinary conference included Statistics and Physics as well to broaden the spectrum of scientific solutions.

I welcome all guests and esteemed professionals from multiple fields to engage in discussions and network in the respective sessions with scholars and students to farther our understanding of the scientific problems. I am sure that this platform will be beneficial for all guests, especially for our students who look forward to this conference whole year and are enthusiastic to participate and learn from members of scientific community. I would encourage our students to actively participate in discussions and ongoing debates so that their scientific knowledge remains up to date.

Lastly, I would like to pay my utmost gratitude to the scientific committee of the conference, who devoted their time and efforts in reviewing the abstract received in the conference. I would also like to congratulate and acknowledge the efforts of the organizing team of the conference.

Thank you.

Prof. Dr. Anila Kamal
Vice Chancellor / Chief Organizer
Rawalpindi Women University, Rawalpindi

Message by Chief Guest (Inaugural Session)

Dear Esteemed Colleagues and Distinguished Participants,

I am delighted to extend my warm greetings to everyone attending the 2nd International Conference of Sciences at Rawalpindi Women University. I believe that through such academic activities we can harness the collective intellect and creativity of brilliant minds. Themes of the conference resonate with the multidisciplinary challenges of the 21st century. Hence, the conference agenda represents an excellent forum for the presentation of innovative research, exchange of ideas, and the development of long-lasting collaborations.

I believe that through such events we can engage in thoughtful discussions, share scientific knowledge, and explore new horizons. These forums remind us of the profound impact of collective and collaborative efforts in bringing change to society. I am looking forward to the exchange of ideas, the forging of new connections, and the exciting discoveries that await us over the course of this conference.

I would like to congratulate the Chief Organizer, Prof. Dr. Anila Kamal and her team at RWU for taking the initiative and successfully executing multidisciplinary conferences.

Dr. Mukhtar Ahmed
Chairman,
Higher Education Commission, Islamabad

Keynote Address:

Applied Research – Nanotechnology Applications

To create an impact of research in the daily life of human beings, it is imperative that the outcome of our research is an innovative product or an improvement in the existing products.

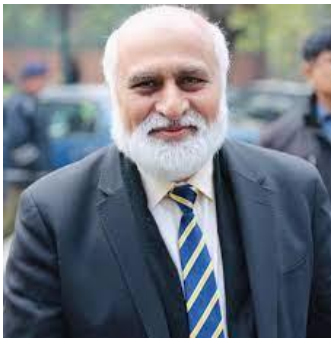
Nanotechnology is poised to bring the next revolution in the industry. Nanotechnology has found its way into biomedical devices, photovoltaic technologies, catalysts, controlled-release fertilizers and drugs, etc.

There is a huge demand for nanotechnology-based products and one such application of nano-bio materials has been explored here.

Owing to good biocompatibility and osseoinductivity, hydroxyapatite (HA) ceramic is a desirable biomaterial for various biomedical applications, especially in the area of orthopedics and orthodontics. This research outlines the products that have been developed to suit different requirements including bone replacement, bone regeneration, bone augmentation, etc.

Prof. Dr. Mohammad Mujahid
Rector,
Pak-Austria Fachhochschule Institute of Applied Sciences and Technology (PAF-IAST), Haripur

Message by Chief Guest (Concluding Session)



It is with great pleasure and excitement that I welcome you all to the 2nd International Conference of Revamped Scientific Outlook of the 21st Century, 2023, a gathering of brilliant minds, innovators, and thought leaders in the field of science. In this scientific event we embark on a journey of discovery, collaboration, and knowledge exchange that will undoubtedly shape the future of science and technology. In an ever-evolving world, scientific research and innovation play a pivotal role in addressing the challenges we face and harnessing the opportunities that lie ahead. Collaboration knows no boundaries, and the solutions to many of our global problems lie in our collective efforts. This conference will provide a unique platform for scientists, researchers, and experts from various disciplines including Botany, Zoology, Chemistry, Physics, Mathematics, and Statistics to come together, share their insights, and foster new collaborations. In this scientific era of multidisciplinary research scientists from diverse fields have to collaborate and solve the issues for wellbeing of society. My great acknowledgment goes to the faculty and administration of this newly established University for grabbing the attention of different scientists from various disciplines which has increased significantly from last year's event. The conference hosted about 200 abstracts which is a valuable contribution to real success of dissemination of knowledge. There is a coverage of a wide range of topics, delving into the latest research, sharing practical experiences, and engaging in thought-provoking conversations. I congratulate young women of this university for their unwavering dedication, passion, and determination and pray that it may propel this university toward a brighter and more promising future.

Prof. Dr. Niaz Akhtar (SI)
Vice Chancellor
Quaid-i-Azam University, Islamabad

Message of the Head of the Department: Botany

With great joy, I extend a warm welcome to all of you to our eagerly awaited 2nd International Conference on the "Revamped Scientific Outlook of the 21st Century, 2023." We at Rawalpindi Women University are deeply grateful for the opportunity to host this special event, and I believe we owe our thanks to the guiding light of the Almighty. Building on the success of last year's conference, I'm now filled with optimism and excitement as we embark on this intellectual journey, anticipating the profound discussions and revelations that will undoubtedly shape the future of botany. The abstracts and proposals submitted for this conference genuinely reflect the remarkable diversity and ingenuity of the global scientific community, serving as a testament to the collective brilliance and unwavering dedication we all share. Each submission represents a unique facet of contemporary botany, offering fresh insights and solutions with the potential to redefine our understanding of the biological world. The Department of Botany at Rawalpindi Women University has long been committed to fostering a culture of scientific excellence and interdisciplinary collaboration, and this conference stands as a testament to our enduring dedication to pushing the boundaries of knowledge. By bringing together diverse perspectives and encouraging the exchange of ideas, we aim to pave the way for a future where scientific innovation and societal progress go hand in hand. We aspire to bring about positive change in our society and contribute to humanity's true development. I applaud the collective efforts of all the contributors, reviewers, and organizers who have devoted their time and expertise to curate an outstanding program for this conference. Your unwavering commitment to the pursuit of scientific inquiry serves as an inspiration to the next generation of

botanists and researchers, instilling in them the passion and determination required to tackle the scientific challenges of the 21st century. As we engage in robust discussions and deliberations during this conference, let us remain steadfast in our commitment to harnessing the power of scientific discovery for the greater good of humanity. May the collaborations fostered, and the knowledge shared during this event serve as catalysts for groundbreaking discoveries and transformative advancements in the realm of botany and beyond. I express my heartfelt gratitude to all the participants and attendees for their invaluable contributions to this conference. May our collective efforts guide us toward a future where scientific innovation not only enriches our understanding of the universe but also paves the way for a more prosperous and sustainable world.

Dr. Mamoona Munir
Head of the Department
Botany

Message of the Head of the Department: Chemistry

I would like to pay a warm welcome to all of you to our 2nd international conference on the "Revamped Scientific Outlook of the 21st Century, 2023." This is our 2nd time that we at Rawalpindi Women University are hosting this special event. All the abstracts and proposals submitted for this conference undoubtedly reflect a remarkable diverse and remarkable scientific community in various fields of chemistry. Our Department of Chemistry at Rawalpindi Women University is enriched with scientific excellence and interdisciplinary collaboration, and off course this conference stands out as platform for exchange of knowledge and ideas among young scientists. It's worth mentioning here the collective and meaningful efforts of all the contributors, reviewers, and organizers of this conference. I am hopeful that the collaborations and the knowledge shared during this event will serve as catalyst for some groundbreaking discoveries and productive advancements in the field of science and technology. Finally, I express my heartfelt gratitude to all the participants and attendees for their precious contributions to this conference and in developing collective efforts for scientific innovation for a more prosperous and sustainable world.

Dr. Hina Naeem
Head of the Department
Chemistry

Message of the Head of the Department: Mathematics

We are delighted to announce the 2nd International Conference of Revamped Scientific Outlook of the 21st Century organized by Rawalpindi Women University. With the world becoming increasingly reliant on technological advancements and educational awareness, the demand for mathematicians in both the public and private sectors is on the rise. This conference aims to bring together researchers, academicians, research scholars, and students to discuss the latest developments in mathematical sciences and explore new avenues for academic and scientific exchange. The conference will provide a forum for participants to share their research findings, exchange ideas, and discuss emerging trends and applications in mathematics. The participants will have the opportunity to engage in fruitful discussions and network with their peers from around the world through plenary talks, paper presentations, and interactive sessions.

The conference will cover a wide range of Mathematics fields, including Fluid Mechanics, Applied and Pure Mathematics, Gravitation and Cosmology, Mathematical Biology, Modelling and Simulation, Cryptography, Computational Fluid Dynamics, and Fractional Calculus. We believe that the conference will provide a unique platform for both academicians and research scientists to showcase their work, exchange their experiences, and discuss the challenges and opportunities facing the field of mathematics in the 21st century. We welcome all interested participants to join us for what promises to be an exciting and engaging event.

Dr. Shagufta Ijaz
Incharge Department
Mathematics

Message of the Head of the Department: Physics

It is with immense pleasure that I extend a warm welcome to each and every one of you to our highly anticipated 2nd international conference of sciences on "Revamped Scientific Outlook of the 21st Century, 2023." I am thankful to Allah for giving us the bravery and motivation at Rawalpindi Women University to plan this special event. After successfully organizing the conference last year, now, as we embark on this intellectual journey, I am filled with optimism and excitement, envisioning the profound discussions and revelations that will undoubtedly shape the future of physics. The abstracts and proposals submitted for this conference truly exemplify the remarkable diversity and ingenuity of the global scientific community. They serve as a testament to the collective brilliance and unwavering dedication we all share. Each submission represents a unique facet of contemporary physics, offering novel insights and solutions that have the potential to redefine our understanding of this physical world. Department of Physics at Rawalpindi Women University has long been committed to fostering a culture of scientific excellence and interdisciplinary collaboration, and this conference stands as a testament to our enduring dedication to pushing the boundaries of knowledge. By bringing together diverse perspectives and encouraging the exchange of ideas, we aim to pave the way for a future where scientific innovation and societal progress go hand in hand. I hope our efforts from this institute will bring a positive change in our society and help to develop humanity on a true basis. I commend the concerted efforts of all the contributors, reviewers, and organizers who have dedicated their time and expertise to curating an exceptional program for this conference. Your unwavering commitment to the pursuit of scientific inquiry serves as an

inspiration to the next generation of physicists and researchers, instilling in them the passion and determination needed to tackle the scientific challenges of the 21st century. As we engage in robust discussions and deliberations during this conference, let us remain steadfast in our commitment to harnessing the power of scientific discovery for the greater good of humanity. May the collaborations fostered, and the knowledge shared during this event serve as catalysts for groundbreaking discoveries and transformative advancements in the realm of physics and beyond. I express my sincerest gratitude to all the participants and attendees for their invaluable contributions to this conference. May our collective efforts guide us towards a future where scientific innovation not only enriches our understanding of the universe but also paves the way for a more prosperous and sustainable world.

Dr. Irfan Qasim
Head of the Department
Physics

Message of the Head of the Department: Statistics

The Scientific Conference intends to facilitate the exchange of cutting-edge research, methodologies, and best practices among Statisticians, Data Analysts, and Researchers. It seeks to foster a collaborative environment that encourages interdisciplinary discussions, promoting the cross-pollination of ideas across various sectors. Additionally, the conference intends to provide a platform for emerging Statisticians to showcase their work and gain valuable insights from experienced professionals.

Dr. Saba Riaz
Head of the Department
Statistics

Message of the Head of the Department: Zoology

Dear esteemed participants, I would like to welcome you all on 2nd International Conference on “Revamped scientific Outlook of the 21st Century, 2023” at Rawalpindi Women University on behalf of Zoology department faculty. The field of Zoology is a tapestry of life's myriad forms and the intricacies of their existence. This conference has brought together minds from various corners of the Zoological field, and the synergy of ideas and discoveries are also reflected in the rich content of this abstract book. We extend our heartfelt gratitude to all the contributors, reviewers, and conference attendees for making this publication possible. Your unwavering commitment to the advancement of Zoological science is commendable, and your contributions will undoubtedly serve as a valuable resource for researchers, educators, and enthusiasts alike. May this conference inspire future generations of zoologists and foster a deeper appreciation of the wonders of the animal kingdom. Thank you for being a part of this exciting journey.

Dr. Samina Qamer
Head of the Department
Zoology

PREFACE

In an era marked by rapid advancements in science and technology, the boundaries between traditional academic disciplines have become increasingly porous. This conference acknowledges the necessity of harnessing the collective wisdom of experts in diverse fields to tackle the multifaceted issues confronting our global society. From climate change and public health to sustainable development, the solutions to these complex problems often require perspectives from multiple scientific domains. The conference program features a diverse array of topics, including but not limited to Botany, Chemistry, Zoology, Physics, and Statistics. Through diverse presentations and discussions, we hope to encourage meaningful interactions that inspire new research directions and novel applications of knowledge. We express our heartfelt gratitude to all the authors, presenters, reviewers, and volunteers who have contributed to making this conference a reality. Without your dedication and enthusiasm, this event would not have been possible. We also extend our thanks to the members of the organizing committee for their tireless efforts in planning and executing this conference. As we embark on this intellectual journey together, we encourage all participants to engage in fruitful discussions, share their insights, and forge new collaborations that have the potential to reshape the landscape of science. We hope that this conference serves as a catalyst for innovation, fostering a spirit of inquiry that transcends disciplinary boundaries.

We wish all the participants a productive and enlightening experience at the 2nd international conference of sciences, "Revamped scientific outlook of 21st century, 2023" at Rawalpindi Women University

Dr. Motsim Billah
Conference Secretary (RSO-21st Century

ACKNOWLEDGMENT

With utmost pleasure, I welcome you all to this year's multidisciplinary conference of sciences 2023. Rawalpindi Women University takes pride in organizing multidisciplinary conference of sciences every year. The aim of these series of conferences was to highlight modern world challenges faced by the scientific community and pave the way towards collective efforts in resolving these complex scientific problems. This year's conference program is a testament of the success of this idea. We hope that the conference agenda will contribute to scholarly discussions and collaborative efforts among researchers across all HEIs of Pakistan and will pave way to farther our scientific knowledge.

This conference is an initiative of our Chief organizer, Prof. Dr. Anila Kamal, and without her guidance and thorough involvement in the conference-related activities, this would not have been possible. I would like to express my deepest gratitude to her for trusting me to manage this conference. I would also like to congratulate the conference organizing team for working round the clock to make this conference a success.

Lastly, although it's a one-day conference but the conference correspondence in the last few months provided me with an opportunity to get to know esteemed scholars and researchers working across all HEIs. I would like to thank you all for your interest in the conference and patience during this process.

Thank you for joining RWU's conference again this year.

Dr. Rayna Sadia
Conference Secretary

As a member of the Office of Research, Innovation and Commercialization (ORIC) and organizing team, it is my great pleasure to welcome members of the scientific community to this signature event of the year 2023 *viz.* 2nd International Conference of Sciences on "Revamped Scientific Outlook of 21st Century, 2023 (RSO, 2023) organized by the Rawalpindi Women University, Rawalpindi on November 15th, 2023.

It is a premier sciences conference with a comprehensive range of sessions that brings together members of academia, scholars, researchers, graduate and post-graduate students, scientists and representatives from government agencies from around the Pakistan and world for one day of immersive learning, sharing and networking.

The conference will be of professional and personal benefit to all of us as we proceed with our work towards a better future. This conference will deliberate and discuss all the different facets of exciting scientific topics and come up with recommendations that will lead to a better, healthier and merrier world.

I hope that the experiences in this event will be engraved in your memory.

Have a great conference time…

Dr. Nasir Mehmood
Assistant Director, ORIC
Rawalpindi Women University
Rawalpindi

Conference Program

Venue: Rawalpindi Women University, Rawalpindi

08:00 am - 09:00 am	**Registrations**
09:00 am - 09:15 am	Guests to be seated
09:15 am - 09:30 am	Arrival of Chief Guest
09:30 am - 10:30 am	**Inaugural Session**
09:30 am - 09:35 am	Recitation from Holy Quran
09:35 am - 09:40 am	National Anthem
09:40 am - 09:50 am	**Welcome Address by** *Prof. Dr. Anila Kamal* *Vice Chancellor, Rawalpindi Women University, Rawalpindi*
09:50 am - 10:00 am	**Keynote Address:** *Dr. Muhammad Mojahid* *Rector PAF – IAST, Haripur*
10:00 am - 10:10 am	**Address by Guest of Honour:** *Prof. Dr. Shahid Mehmood Baig* *Chairman, Pakistan Science Foundation, Lahore*
10:10 am - 10:20 am	**Remarks by Chief Guest:** *Dr. Mukhtar Ahmed* *Chairman, Higher Education Commission (HEC), Islamabad*
10:20 am - 10:30 am	Shields Distribution to the Chief Guest & Keynote Speakers by *Prof. Dr. Anila Kamal* *Vice Chancellor, Rawalpindi Women University, Rawalpindi*
10:30 am - 10:40 am	Group Photo
10:40 am - 11:00 am	**Tea Break**
11:00 am - 01:00 am	**Parallel Sessions**
	Session IA: Botany (Room 15, Block A - Ground Floor)
	Session IB: Botany (Room 51, Block A - 1st Floor)
	Session IC: Chemistry (Room 286 - Sheikh Rasheed Block)
	Session ID: Mathematics (Room 300 - Sheikh Rasheed Block)
	Session IE: Physics (Webinar Room - Sheikh Rasheed Block)
	Session IF: Statistics (Room 28, Block A - Ground Floor)
	Session IG: Zoology (Fatima Hall)
	Session IH: Zoology (Room 33, Block A - Ground Floor)
11:00 am - 12:30 pm	**Posters Display**
	Botany (Corridor- Block A, Ground Floor)
	Chemistry (Gallery- 2nd Floor Sheikh Rasheed Block)
	Physics (Gallery- Ground Floor Sheikh Rasheed Block)
	Zoology (Corridor- Block A, 1st Floor)
01:00 pm - 01:45 pm	**Lunch & Namaz Break**

01:45 pm - 03:45 pm	**Parallel Sessions**
	Session IIA: Botany (Room 15, Block A - Ground Floor)
	Session IIB: Chemistry (Room 286 -Sheikh Rasheed Block)
	Session IIC: Mathematics (Room 300-Sheikh Rasheed Block)
	Session IID: Physics (Webinar Room- Sheikh Rasheed Block)
	Session IIE: Statistics (Room 28, Block A - Ground Floor)
	Session IIF: Zoology (Fatima Hall)
	Session IIG: Zoology (Room 33, Block A - Ground Floor)
03:45 pm - 04:30 pm	**Panel Discussion**
Panelists	*Prof. Dr. Mushtaq Ahmad, Quaid-i-Azam University, Islamabad*
	Prof. Dr. Ghulam Ali, National University of Science and Technology, Islamabad
	Prof. Dr. Safia Akram, National University of Science and Technology, Islamabad
	Prof. Dr. Waqas Masood, COMSATS, Islamabad
	Prof. Dr. Tahir Mehmood, National University of Science and Technology, Islamabad
	Prof. Dr. Ishtiaq Ali, Quad-i-Azam University, Islamabad
04:30 pm - 05:30 pm	**Concluding Ceremony**
04:43 pm - 04:45 pm	Certificate distribution
04:45 pm - 05:00 pm	Concluding Remarks by *Prof. Dr. Niaz Ahmed Akhtar (SI) Vice Chancellor, Quaid-i-Azam University, Islamabad*
05:00 pm - 05:10 pm	Concluding Remarks by Chief Organizer: *Prof. Dr. Anila Kamal Vice Chancellor, Rawalpindi Women University, Rawalpindi*
05:10 pm - 05:30 pm	Tea for distinguished guests

ORAL PRESENTATIONS

Session IA

Botany

Venue: Room-15 Block A – Ground Floor)

11:00 am - 01:00 pm

Themes: Microbiology, Plant Protection & Pest Control, Biotechnology

Chair: Dr. Tariq Mahmood

Professor,
Quaid-i-Azam University, Islamabad

Co-Chair: Dr. Muhammad Farhan

Associate Professor,
Government College University, Lahore

Time	Keynote Talks
11:00 am-11:19 am	**Role of Endophytic Bacteria in Promoting Plant Growth and Sustainability**
	Prof. Dr. Azra Yasmin. *(Fatima Jinnah Women University, Rawalpindi)*
11:19 am-11: 34 am	**Hemp (*Cannabis sativa)* as a Natural Nematicide against Root-Knot Nematodes (*Meloidogyne incognita*)**
	Prof. Dr. Tariq Mukhtar. *(PMAS-Arid Agriculture University, Rawalpindi)*

Time	Oral Presentations
11:34 am-11:43 am	**BOT-28 Exploring Allelopathic Potential of Pseudomonas against Cotton Weed (*Sorghum Halepense*)**
	Jabeen, N., & Siddique, A. *(Minhaj University, Lahore)*
11:43 am-11:52 am	**BOT-158 Production, Optimization, and Characterization of *Serratia nematodiphila* MB307 to Synthesize Polyhydroxybutyrate using Wastewater in Submerged Fermentation**
	Pervaiz, M., & Yasmin, A. *(Fatima Jinnah Women University, Rawalpindi)*

11:52 am - 12:01 pm	**BOT-144 Biological Control of Chili Damping-off Disease, Caused by *Pythium myriotylum***
	Hyder, S., Haq, M. I., Gondal, A. S., & Rizvi, Z. F. *(Government College Women University Sialkot, Sialkot)*
12:01 pm - 12:10 pm	**BOT-145 Application of Potential Bio-agents and Vermicompost in the Management of Tomato Early Blight Disease**
	Khan, A. R., Hyder, S., Rizvi, Z. F., & Gondal, A. S. *(Government College Women University Sialkot, Sialkot)*
12:10 pm - 12:19 pm	**BOT-202 Impact of *Trichoderma Harzianum* Broth and Leaves Powder of *Cassia fistula* and *Azadirachta indica* on Early Blight of Tomato**
	Shafqat, A., Shakir, R., & Akhtar, S. *(Minhaj University, Lahore)*
12:19 pm - 12:28 pm	**BOT-253 Bioremediation of Crude Oil Contaminated Soil with Plant Microbiome System**
	Saeed, N., Ilyas, N., Arshad, M., Sheeraz, M., Ahmed, I., & Bhattacharya, A. *(PMAS-Arid Agriculture University, Rawalpindi)*
12:27 pm- 12:36 pm	**BOT-305 Utilization of agro-waste and PGPR for Eco-Friendly Bio-fertilizer production for sustainable agriculture**
	Bibi, F., Ilyas, N., Saeed, M., Shabir, S., Munir, M., Abbasi, B. A., & Zahra, S. A. *(Rawalpindi Women University, Rawalpindi)*
12:36 pm- 01:00 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IB
Botany

Venue: Room-51 Block A - 1st Floor
11:00 am - 01:00 pm

Themes: Plant Ecology, Biodiversity, Systematics, & Physiology

Chair: Prof. Dr. Rahmatullah Qureshi
Professor,
PMAS- Arid Agriculture University, Rawalpindi

Co-Chair: Dr. Syed Aneel Ahmad Gilani
Pakistan Museum of National History, Islamabad

Time	Keynote Talks
11:00 am - 11:15 am	**Traditional plant knowledge from people to the society. Aims, Approaches, and Achievements of Ethnobotany**
	Prof. Dr. Joan Vallès Xirau. *(University of Barcelona, Spain)*

Time	Oral Presentations
11:16 am - 11:25 am	**BOT-231 Environmental Monitoring of Self-Sustaining Artificial Micro Ecosystem**
	Fatima, A., & Qadeer, S. *(Allama Iqbal Open University, Islamabad)*
11:25 am - 11:34 am	**BOT-301 In-silico Analysis of Serpin Gene Family in *Setaria italica* [L.] at Genome Level**
	Batool, A., Rehman, S., Malik, S., Abbasi, B. A., Amna., & Iqbal, J. *(Rawalpindi Women University, Rawalpindi)*
11:34 am 11:43 am	**BOT-388 Unveiling Biological Potential and Phytochemical Screening of *Lactuca orientalis* (Boiss.) Boiss**
	Zahra, S. A., Mahmood, T., Abbasi, B. A., Iqbal, J., Munir, M., Bibi, F., & Hameed, A. *(Rawalpindi Women University, Rawalpindi)*

11:44 am - 11:54 pm	**Ecological Risk Assessment of Heavy Metals in Fresh Water Stream Nala Palkhu, Sialkot, using Sediments and Aquatic Plants**
	Yasir, F. *(Government College Women University Sialkot, Sialkot)*
11:54 am- 12:04 pm	**BOT-427 Baseline studies and Conservation Status of the Plant Bio-Diversity of Kurram District KPK**
	Gilani, S. A. A. *(Pakistan Museum of Natural History, Islamabad)*
12:04 pm- 12:14 pm	**BOT-352 Modulation of Barley (*Hordeum vulgare* L.) Defense and Hormonal Pathways by Pseudomonas Species Accounted for Salinity Tolerance**
	Zaib, S., Ahmad, I., Shakeel, S. N. *(Quaid-i-Azam University, Islamabad)*
12:14pm- 12:24 pm	**BOT-418 Multi-stress Tolerance of PGPR *Bacillus siamensis* PM 15 to Suppress Sugarcane Fungal Diseases**
	Amna, S. M., Rehman, S., Zainab, N., Chaudhary, H. J. *(Rawalpindi Women University, Rawalpindi)*
12:25 pm- 01:00 pm	**Q & A Session**
	Session Concluding Remarks by *Session Chair* and *Co-Chair* Shields and Certificates Distribution

Session IIA

Botany

Venue: Room-15 Block A - Ground Floor

01:45 pm - 03:45 pm

Themes: Plant Physiology, Molecular Biology, Biodiversity, & Conservation

Chair: Prof. Dr. Zarrin Fatima Rizvi

Pro Vice Chancellor,
Government College Women University Sialkot, Sialkot

Co-Chair: Dr. Riffat Tahira

Program Leader / Principal Scientific Officer, National Agriculture Research Council, Islamabad

Time	Keynote Talks
01:45 pm - 02:05 pm	**Interdisciplinary Approaches in Biological Sciences to Sustainable Application for Alternative Biomass Energy, Food, and Health**
	Prof. Dr. Mushtaq Ahmad *(TI). (Quaid-i-Azam University, Islamabad)*

Time	Oral Presentations
02:05 pm - 02:15 pm	**BOT-559 Mitigating Pb uptake in *Capsicum annuum* L. Var Shooter Using Rice Husk based Biochar**
	Azam, Z., Kanwal, A., Farhan, M., Butt, Z. A., & Ahmad, M. *(Government College Women University Sialkot, Sialkot)*
02:15 pm - 02:25 pm	**BOT-344 Synergistic Effect of Phyto-Mediated Nanoparticles on Photocatalytic Degradation of Azo Dyes**
	Nadeem, A., Kazmi, Z., & Safdar, N. *(Fatima Jinnah Women University, Rawalpindi)*
02:25 pm - 02:35 pm	**BOT-400 Efficiency of Multiple Extraction Solvents on Antioxidant, Antibacterial, and Phytotoxicity of *Allium jacquemontii***
	Akhtar, W., Khan, M. A. & Naqvi, R. F. *(University of Azad Jammu and Kashmir, Muzaffarabad)*
02:35 pm - 02:45 pm	**BOT-112 Fabrication of *Rhamnus triquetra* Wall. Based Ag2ONPs and their Diverse Invitro Biological Applications**
	Abbasi, B. A., Iqbal, J., Yaseen, T., Zahra, S. A., Rehman, S., Munir, M., Amna., Bibi, F., & Mahmood, T. *(Rawalpindi Women University, Rawalpindi)*
02:45 pm - 02:55 pm	**BOT-202 Impact of *Trichoderma harzianum* Broth and Leaves Powder of *Cassia fistula* and *Azadirachta indica* on Early Blight of Tomato**
	Shafqat, A., Shakir, R., & Akhtar, S. *(Minhaj University, Lahore)*

02:55 pm - 03:05 pm	**BOT-236 Synthesis and Characterization of Biodiesel Via *Trifolium resupinatum* L. Seeds Oil Using Green Heterogeneous Nanocatalyst**
	Munir, M., Ahmad, M., Abbasi, B. A., Bibi, F., & Sultana, S. *(Rawalpindi Women University, Rawalpindi)*
03:05 pm - 03:15 pm	**BOT-239 Role of Biochar in Plant Physiology, Growth and Antioxidant Defense under Drought Stress**
	Bashir, S. *(The Women University Multan, Multan)*
03:15 pm - 03:45 pm	**Q & A Session**
	Session Concluding Remarks by *Session Chair* and *Co-Chair* Shields and Certificates Distribution

Session IC
Chemistry

Venue: Room-286 Sheikh Rasheed Block
11:00 am - 01:00 pm

Themes: Scope of Physical, Inorganic, Organic, Analytical and Biochemistry, Dye sensitized Solar cells / Energy Storage Devices, 2D-Nanomaterials, Photocatalysis, Nanotechnology, Organic Scaffold for Material & Medicinal Chemistry

Chair: Dr. Muhammad Salman

Associate Professor,
University of the Punjab, Lahore

Co-Chair: Dr. Muhammad Ajmal

Assistant Professor,
University of Education, Attock Campus

Time	Keynote Talks
11:00 am - 11:15 am	**Integrated Energy Systems: From Materials to Technology**
	Eng. Prof. Dr Ahmed Shuja. *(International Islamic University, Islamabad)*

11:15 am - 11:30 am	**Current Status and Future Perspectives of the Platinum-Based Anticancer Drugs**
	Prof. Dr. Zia ur Rehman *(Quaid-i-Azam University, Islamabad)*

Time	Oral Presentations
11:30 am - 11:38 am	**Recognizing the Mechanism of Anti-cancerous Activity of Metal-Guanidinobenzimidazole through Computational Screening**
	Jabeen, E., Ghani, K., & Yousaf, S. (*Allama Iqbal Open University, Islamabad)*
11:38 am - 11:45 am	**Mycogenic Synthesis of Ag/ZnO Nanocomposite for Antimicrobial Activity**
	Abbasi, Z., & Uzair, B. (*International Islamic University, Islamabad*)
11:45 am 11:52 am	**Fabrication and Assay of Quercetin-based Hydroxyl Radical Electrochemical Detectors**
	Rehman, R., & Jabeen, E. (*Allama Iqbal Open University, Islamabad*)
11:52 am - 12:00 pm	***Aspergillus terreus* Mediated Magnesium Oxide Nanoparticles Synthesis, Characterization, and Screening of Anticandidal Activity**
	Abbas, S., & Uzair, B. *(International Islamic University, Islamabad)*
12:00 pm- 12:08 pm	**Optimization of Various Parameters for Highly Capacitive N-doped Carbon Materials as an Electrochemical Supercapacitor's Electrode**
	Serwar, M., Rana, U. A., Siddiqi, H. M., Adomkevicius, A., Jose A, Coca-Clemente, Fernandez, L. C., Braga, F., & Hardwick, L. J. *(Women University Mardan, Mardan)*
12:08 pm- 12:15 pm	**A DFT Study of Mn-Corrole as a Single Atom Catalyst for CO Oxidation**
	Hashmi, M. A., & Ain, Q. *(University of Education, Lahore, Attock Campus, Attock)*
12:15 pm- 12:22 pm	**Impedance Spectroscopic Analysis of PbSe Nanostructures Deposited by AACVD Approach**
	Iram, S., Mahmood, A., & Malik, M. A. (*National University of Science and Technology, Islamabad)*

12:22 pm-12:29 pm	**Synthesis, Structural, and *in vitro* Biological Evaluation of Carbothioamides**
	Aziz, H., & Saeed, A. *(Quaid-i-Azam University, Islamabad)*
12:29 pm-12:36 pm	**Enhanced Recovery of Bio-Oils from Algae Through Pretreatment**
	Batool, S., & Qadeer, S. *(Allama Iqbal Open University, Islamabad)*
12:36 pm-12:43 pm	**Flood Susceptibility in The Indus Region Based On MCDA**
	Ali, S. M., Shafquat, A., Rehman, A, A., Afzal, Z., Batool, A., & Hanif, B. (*International Islamic University, Islamabad)*
12:43 pm-12:50 pm	**Synthesis and Investigation of Aggregation Induced Emission Properties of Tetraphenylethylene Derivatives**
	Anjum, A., & Farooq, U. *(CUIADT campus, Abbottabad)*
12:50 pm - 01:00 pm	**Q & A Session**
	Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IIB
Chemistry

Venue: Room-286 Sheikh Rasheed Block
01:45 pm - 03:45 pm

Themes: Environmental Chemistry, Green chemistry and global climate change, Chemistry in agriculture and natural sciences, Inorganic, Organic, Analytical and Biochemistry

Chair: Prof. Dr. Hassan Abbas

Professor,
Quaid-i-Azam University, Islamabad

Co-Chair: Dr. Javeed Akhtar

Associate Professor,
Mir Pur University of Science and Technology, Mirpur

Time	Keynote Talks
01:45 pm-02:00 pm	**Smart Polymer Microgels and Hybrid Microgels for Environmental and Catalytic Applications**
	Dr. Zahoor Hussain Farooqi. (*University of the Punjab, Lahore)*
2:00 pm - 2:15 pm	**Polymeric Materials and their Use in the Biomedical, Environmental, and Energy Field**
	Dr. Sultan B Sengel. *(Eskisehir Osmangazi University, Turkey)*

Time	Oral Presentations
02:15 pm-02:22 pm	**Facile Synthesis of Highly Fe-doped ZnO Nanoparticles by One-Step Solution Plasma Process**
	Saqib, A. N. S., Kim, S. W., Jung, M. H., Lee, Y. H. *(University of Education Lahore, Attock Campus)*
02:22 pm-02:29 pm	**Potential of A^3-coupling Reaction towards the Synthesis of Medicinally Important Heterocyclic Motifs: Our Efforts**
	Shehzadi, S. A. *(International Islamic University, Islamabad)*
02:29 pm-02:39 pm	**Synthesis of Microgel Fabricated with Silver Nanoparticles for Catalytic Applications**
	Ajmal, M., Ahmad, M., & Siddiq, M. *(University of Education, Lahore)*
02:39 pm-02:48 pm	**Design, Synthesis, and Evaluation of Acetylcholinesterase and Butyrylcholinesterase Dual-Target Inhibitor against Alzheimer's Diseases**
	Rasheed, L. *(Rawalpindi Women University, Rawalpindi)*
02:48 pm-02:56 pm	**Photosensitizers with Superior Photovoltaic Performance in DSSCs**
	Ashraf, S., Akhtar, J., Siddiqi, H. M., & Shafei, A. E. *(Rawalpindi Women University, Rawalpindi)*

02:56 pm- 03:04 pm	**Graphene Oxide-Silver Nano Composite Synthesis for Removal of Multiple Pollutants by Adsorption, Catalysis, and Antibacterial Activity**
	Naeem, H., Ajmal, M., & Siddiq, M. *(Rawalpindi Women University, Rawalpindi)*
03:04 pm- 03:12 pm	**Performance of Pyrocatechol Violet and Carminic acid Sensitized ZnO/CdS Nanostructured Photoactive Materials for Dye Sensitized Solar Cell**
	Ansir, R., & Shah, S. M. *(Quaid-i-Azam University, Islamabad)*
03:12 pm- 03:21 pm	**Synthesis, SAR Elucidations and Molecular Docking Study of Newly Designed Isatin based Oxadiazole Analogs as Potent Inhibitors of Thymidine Phosphorylase**
	Javid, M. T. *(Rawalpindi Women University, Rawalpindi)*
03:21 pm- 03:30 pm	***Azadirachta indica* assisted Green Synthesis of Magnetic Ag/GO-Fe3O4 Nanocomposite for Solid Phase Extraction of Tetracyclines from Milk**
	Anjuma, J., Sajid, M., Shehzadi, S. A., Sajjad, M., Siddique, A., & Jabbar, K. A. *(International Islamic University, Islamabad)*
03:30 pm- 03:45 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session ID
Mathematics

Venue: Room-300 Sheikh Rasheed Block

11:00 am - 01:00 pm

Themes: Pure & Computational Mathematics, Modeling & Simulations
Chair: Prof. Dr. Noreen Sher Akbar
Professor, *National University of Sciences and Technology, Islamabad*
Co-Chair: Dr. Ehnber Maraj
Associate Professor, *National Skills University, Islamabad*

Time	Keynote Talk
11:00 am- 11:30 am	**Beyond Fourier's Law: MHD Peristalsis** Prof. Dr. Tasawar Hayat. *(Quaid-i-Azam University, Islamabad)*

Time	Oral Presentations
11:30 am- 11:40 am	**The Study of Topological Indices Via M-Polynomial Approach of Triangular Boron Nanotube** Hussain, S. (*The University of Lahore, Lahore*)
11:40 am- 11:50 am	**Gravitational Collapse of Friedmann-Robertson-Walke (FLRW) Universe** Sattar, S. (*Ghazi University, Dera Ghazi Khan*)
11:50 am- 12:00 pm	**Spikes Leads to Large Scale Structures Like Galaxies** Moughal, M. Z. A. (*National University of Sciences and Technology, Islamabad*)
12:00 pm- 12:10 pm	**On Sobolev Theorem for Higher Commutators of Fractional Integrals in Grand Variable Herz Spaces** Sultan, B. (*Abdul Wali Khan University, Mardan*)
12:10 pm- 12:20 pm	**Alliances in Graphs and Graph Security** Ali, M. (*National University of Sciences and Technology, Islamabad)*

12:20 pm-12:30 pm	**Direct Approach for The Fractional View Analysis of Heat and Wave Equations**
	Khan, H. (*Abdul Wali Khan University, Mardan*)
12:30 pm-12:40 pm	**Zero-Dimensional Modeling and Simulation of Diesel Engine**
	Waheed, A. (*Bahauddin Zakariya University, Multan*)
12:40 pm-01:00 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IIC
Mathematics

Venue: Room-300 Sheikh Rasheed Block
Time: 01:45 pm – 03:45 pm

Themes: Numerical Analysis, Fluid Dynamics, & Mathematical Biology`

Chair: Dr. Zahid Iqbal

Associate Professor,
Allama Iqbal Open University, Islamabad

Co-Chair: Dr. Hina Sadaf

Associate Professor,
National University of Sciences and Technology, Islamabad

Time	Keynote Talks
01:45 pm-02:15 pm	**Modeling and Numerical Simulation of Non-Newtonian Arterial Blood Flow for Mild to Severe Stenosis**
	Prof. Dr. Sohail Nadeem. (*Quaid-i-Azam University, Islamabad*)
02:15 pm-02:30 pm	**Numerical Solutions of Some Fractional Differential Equations with Different Kernels**
	Prof. Dr. Ali Akgül. (*Siirt University, Turkey*)

Time	Oral Presentations
02:30 pm-02:38 pm	**Mathematical Study of Blood Flow in Catheterized Diverging Tapered Stenosed Arteries with Emerging Shaped Nanoparticles: Application in Cancer Therapy**
	Akbar, S. N. (*National University of Sciences and Technology, Islamabad*)
02:38pm-02:46 pm	**Thermal Enhancement of Nano-Fluidic Transport Confined Between Disk and Cone Both Rotating with Distinct Angular Velocities and Heat Transfer**
	Maraj, E. (*National Skills University, Islamabad*)
02:46 pm-02:54 pm	**Theoretical Study of (Gold+ Platinum / Water) Nanofluid with Variable Viscosity Driven through Peristaltic Flow Phenomenon**
	Iftikhar, N. (*BUITEMS, Quetta*)
02:54 pm-03:02 pm	**Metachronal Wave Impact in a Channel Flow of Prandtl Fluid Model**
	Sadaf, H. (*National University of Sciences and Technology, Islamabad*)
03:02 pm-03:10 pm	**Axisymmetric Flow of Casson Fluid by a Swirling Cylinder under Generalized Fourier Law**
	Malik, R. (*International Islamic University, Islamabad*)
03:10 pm-03:18 pm	**Computational Intelligence Approach for Optimising MHD Casson Ternary Hybrid Nanofluid Over the Shrinking Sheet with the Effects of Radiation**
	Zeeshan, A., Khan, M. I., & Ellahi. R., (*International Islamic University, Islamabad*)
03:18 pm-03:26 pm	**Propulsion of Taylor's Swimming Sheet through Rheological Mucus**
	Asgha, Z. (*Prince Sultan University, Riyadh, Saudi Arabia*)
03:26 pm-03:34 pm	**Comparison of Levenberg-Marquardt and Bayesian Regularization Backpropagation based Networks for Solving Differential Equations**
	Habiba, U. (*HITEC University, Taxila*)

03:34 pm- 03:45 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IE

Physics

Venue: Webinar Room-Sheikh Rasheed Block)

Time: 11:00 am - 01:00 pm

Themes: Functional Materials, Energy Materials, Nanomaterials, & Optical Materials

Chair: Prof. Dr. Kashif Nadeem

Professor,
International Islamic University, Islamabad

Co-Chair: Dr. Usman Hasan

Senior Scientific Officer,
National Centre for Physics, Islamabad

Time	Keynote Talks
11:00 am- 11:20 am	**Science, Technology, and Innovation in the Islamic Countries: Status, Prospects, and Challenges**
	Dr. Syed Khurshid Hasanain. *(Committee on Scientific and Technological Cooperation, COMSTECH)*
11:20 am- 11:40 am	**Revamping Humanity: The Evolution of Man-Made Materials**
	Dr. M. Saifullah Awan. (*National Centre for Physics, Islamabad*)

Time	Oral Presentations
11:40 am- 11:50 am	**Basics of Photoacoustics for Gas and Aerosol Concentration Measurements**
	Rahman, A. (*University of Szeged, Hungary)*
11:50 am- 12:00 pm	**Effect of Plant Extract on Antibacterial Activity of Silver, Iron-Silver Bimetallic Nanoparticles**
	Faiz, H., Faiz, R., Parveen, B., Rashid, R., & Ali, R. (*Lahore Garrison University, Lahore)*

12:00 pm-12:10 pm	**Surface Analysis of Ag-doped CdS thin Films using XPS for Sustainable Energy**
	Mahmood, W., Thomas, A., Jakman, M., Haq, A., Nasir, M. F., & Shah, N. A. (*Rawalpindi Women University, Rawalpindi*)
12:10 pm-12:20 pm	**Spectroscopic Analysis of Plasma Liquid Interactions during Synthesis of Gold Nanoparticle**
	Yasin, H. M., & Rehman, N. (*COMSATS University, Islamabad*)
12:20 pm-12:30 pm	**Exploratory and Computational Examination of the Impact of Cobalt Substitution on the Structural, Impedance, Electronic, Magnetic, and Optical Characteristics of Fe_2TiO_5 with Pseudobrookite Structure**
	Haq, N., M., Shafiq, A., Zia, L., & Mumtaz, A., (*Rawalpindi Women University, Rawalpindi)*
12:30 pm-12:40 pm	**Stable Piezoelectric Response for High-Temperature Piezoelectric Applications**
	Qaiser, M. A. (*Jiangsu University, Zhenjiang)*
12:40 pm-12:50 pm	**Solution Processed Exfoliation of 2D Materials for Electronic Devices**
	Ali, J., Pervez, K., Casiraghi, C., & Novoselov, K. (*COMSATS University, Islamabad)*
12:50 pm-01:00 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IID
Physics

Session IIe: Physics (Webinar Room-Sheikh Rasheed Block)
Time: 01:45 am - 03:45 pm

Themes: Magnetic Materials, Functional and Energy Materials, Theoretical and Particle Physics, Plasma Physics

Chair: Prof. Dr. M. Asghar Hashmi,

Controller of Examination,
National Skills University,
Islamabad

Co-Chair: Dr. Saadi Ishaq

Assistant Professor,
National University of Science and Technology, Islamabad

Time	Keynote Talks
01:45 pm-02:00 pm	**Topological Materials**
	Dr. Kashif Sabeeh. (*Quaid-i-Azam University, Islamabad*)
02:00 pm-02:15 pm	**Direct Materials for Electrical Storage**
	Dr. Vladimir V. Shvartsman. *(University of Duisburg-Essen, Essen, Germany)*

Time	Oral Presentations
02:15 pm-02:25 pm	**Magnetic and Magnetothermal Studies of Germanium Doped Gadolinium Silicide Nanoparticles for Hyperthermia Applications**
	Hisham, M., Al-Nasir., & Manzoor, S. (*Riphah International University, Islamabad)*
02:25 pm-02:35 pm	**Increased lithium-ion Storage Capacity of Ferrite Nanoparticles by Hybridization with Multi-walled Carbon Nanotubes**
	Mubasher (*Riphah International University, Islamabad*)
02:35 pm-02:45 pm	**Tailoring Zeolite-Composite (ZC) Impregnated Nonporous Membranes for Potential Gas Separation and Antibacterial Performances**

	Afzal, A., & Fatima, Z. (*University of Engineering and Technology, Lahore)*
02:45 pm-02:55 pm	**Loop Dynamics of a Fully Discrete Short Pulse Equation**
	Sarfraz, H., Saleem, U., & Hanif, Y. (*University of the Punjab, Lahore*)
02:55 pm-03:05 pm	**Supersymmetric Hybrid Inflation in Grand Unified Theories (GUTs)**
	Aftab, F. (*The Science School Islamabad)*
03:05 pm-03:15 pm	**2-D drift Solitary Structures in inhomogeneous Magnetized O-H ion Plasmas with Generalized (r,q) Distributed Electrons**
	Ali, G., Masood, W., Malik, M. U., Ahmad, A., & Nasir, R. (*Rawalpindi Women University, Rawalpindi)*
03:15 pm-03:25 pm	**Experimental and Numerical Investigations on Feasibility of Inorganic $KSnCl_3$ Perovskite Absorber and SWCNT-HTL for Solar Cells**
	Abdin, Z., Qasim, I., Malik, M. I., & Rashid. M., (*Riphah International University, Islamabad)*
03:25 pm-03:35 pm	**Pseudosmooth Tribrid Inflation in $SU(5)$**
	Masoud, M. A. *(The Science School)*
03:35 pm-03:45 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IF
Statistics

Venue: Room-28 Block A - Ground Floor
Time: 11:00 am - 01:00 pm

Themes: Design of Experiments, Multivariate Analysis, Survey Sampling, Bayesian Statistics, & Time Series Forecasting

Chair: Prof. Dr. Muhammad Hanif

Professor,
PMAS-Arid Agriculture University, Rawalpindi

Co-Chair: Dr. Shakeel Ahmed

Assistant Professor *National University of Science and Technology, Islamabad.*

Time	Keynote Talk
11:00 am-11:15 am	**Forecasting Consumer Price Index with FOMC Sentimental Index**
	Prof. Dr. Jong-Min Kim. *(University of Minnesota-Morris, Morris)*

Time	Oral Presentations
11:15 am-11: 23 am	**Spatial Analysis of Water Quality Index using Principal Component Weight Index and Multivariate Analysis**
	Baber, R., Nazir, H. M., Hussain, I., Akhtar, I., Ahmed, Z., Zulfiqar, S., Bhatti, N. Z. H., & Amin, M. *(University of Sargodha, Sargodha)*
11:23 am-11:31 am	**On the Improvement of Estimator(s) Using Fuzzy Approach under Simple Random Sampling Scheme**
	Ashfaq, H., & Mustafa, M. *(PMAS-Arid Agriculture University, Rawalpindi)*
11:31 am-11:39 am	**Robust Moving Average Control Chart for Dispersion Parameter**
	Hussain, M., Akhtar, N., Amir, M. W., & Hassan, M. S. *(University of Sargodha, Sargodha)*
11:39 am-11:47 am	**A Comparative Analysis of Randomized Response Models for Quantitative Data**
	Narjis, G. *(Rawalpindi Women University, Rawalpindi)*
11:47 pm-11:55 am	**Forecasting of Life Expectancy Rate at Birth in Some SAARC Countries**
	Fatima, I., Zubair, M., & Yasin, A. *(University of Sargodha, Sargodha)*
11:55 am-12:03 pm	**On Proper Choice of Location Control Charts under Ranked Set Sampling**
	Akhtar, N., Amir, M. W., Khan, U.A., & Abbas, S. *(University of Sargodha, Sargodha)*
	Apple Production of Pakistan: A Time Series Modeling and Forecasting

12:03 pm-12:11 pm	Amir, M. W., Yasin, A., Hassan, M. S., & Hussain, M. *(University of Sargodha, Sargodha)*
12:11 pm-12:19 pm	**Forecasting Analysis of Drought Hazards through Automatic Time Series Analysis**
	Qamar, S., Mukhtar, K., & Ali, Z. *(University of Sargodha, Sargodha)*
12:19 pm-12:27 pm	**Efficient Classes of Estimators of Population Variance in Two-Phase Successive Sampling under Random Non-Response**
	Basit, Z., & Bhatti, M. I. *(Government College Women University Sialkot, Sialkot)*
12:27 pm-12:35 pm	**Dual use of Study Variable: A Novel Approach to Estimate the Finite Population Mean**
	Khan, A. A., Ullah, K., Hussain, Z., Asim, M., & Asif, M. *(Government Postgraduate College Kohat, Kohat)*
12:35 pm-12:43 pm	**A New Randomized Response Model for Simultaneous Estimation of Mean of Two Sensitive Variables**
	Alam, S. *(International Islamic University, Islamabad)*
12:43 pm-01:00 pm	**Q & A Session**
	Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IIE
Statistics

Venue: Room-28 Block A - Ground Floor
Time: 01:45 pm – 03:45 pm

Themes: Big Data & amp; High-Dimensional Data Analysis, Data Science / Machine Learning, Applied Statistics

Chair: Dr. Sajid Ali

Associate Professor
Quaid-i-Azam University, Islamabad

Co-Chair: Dr. Nadia Shabnam

Assistant Professor
National University of Medical Sciences, Islamabad

Time	Keynote Talk
01:45 pm-02:00 pm	**Machine Learning and its Applications** Prof. Dr. Tahir Mehmood. *(National University of Science and Technology, Islamabad)*

Time	Oral Presentations
02:00 pm-02:08 pm	**Economic Growth Dynamics: Exploring the Role of Manufacturing, Trade, and Youth Employment in Lower Middle-Income and Highly Indebted Countries** Ain, Q., & Manzoor, S. *(Islamia College Peshawar, Peshawar)*
02:08 pm-02:16 pm	**A Comparison between Exponential Smoothing and Fuzzy Neural Network Techniques in Time Series Forecasting** Khan, A., & Mustafa, S. *(PMAS-Arid Agriculture University, Rawalpindi)*
02:16 pm-02:24 pm	**Identification of Different Diseases in Medical Sciences by using the Stochastic Diffusion Model** Habib, N., & Hanif, H. *(PMAS-Arid Agriculture University, Rawalpindi)*

02:24 pm-02:32 pm	**Ensuring Quality Service in Emergency Response: A Control Chart Approach for Rescue 1122**
	Riaz, A., Nazir, H. Z., Akhtar, N., Ahamd, Z., Zubair, M., & Sarwar, M. *(University of Sargodha, Sargodha)*
02:32 pm-02:40 pm	**Modeling of Bivariate Discrete Dependent Extremes**
	Ahmad, T. *(CREST, ENSAI, France)*
02:40 pm-02:48 pm	**Association between Celebrity Adoration and Self Esteem: A Study of K-Pop Undergraduate Female Fans**
	Masood, M., & Ijaz, M. *(Rawalpindi Women University, Rawalpindi)*
02:48 pm-02:56 pm	**Estimation of Poverty Bounds for Pakistan using Synthetic Panel Data**
	Shabnam, N., Aurangzeb, N., Ameer, W., Ashraf, M.A., Shah, S. Hasanat., & Riaz, S. *(International Islamic University, Islamabad)*
02:56 pm-03:04 pm	**Prevalence of Test Anxiety and Academic Performance among Undergraduate Students**
	Bibi, H., & Ijaz, M. *(Rawalpindi* Women University, Rawalpindi)
03:04 pm-03:12 pm	**A Comparison of Different Fertility Models for South Asia**
	Khalil, M., Ali, Sajid., & Adil, M. *(Quaid-i-Azam University, Islamabad)*
03:12 pm-03: 20 pm	**Estimation of Unemployment duration among Graduates (2015-2020) using Survival Analysis**
	Basharat, R., & Ijaz, M. *(Rawalpindi Women University, Rawalpindi)*
03:20 pm-03: 28 pm	**Survival Analysis of Infants in Small Areas Using some Indirect Methods**
	Ahmed, S., & Hussain, A. *(National University of Science and Technology, Islamabad)*

03:28 pm- 03:45 pm	**Q & A Session** Session Concluding Remarks by Session Chair and Co-Chair Shields and Certificates Distribution

Session IG
Zoology

Venue: Fatima Hall

Time: 11:00 am - 01:00 pm

Themes: Health Sciences, Biotechnology, & Microbiology

Chair: Prof. Dr. Muhammad Jawad Hassan

Professor,
(National University of Medical Sciences, Islamabad)

Co-Chair: Dr. Muhammad Sajid Nadeem

Associate Professor,
PMAS- Arid Agriculture, Rawalpindi

Time	Keynote Talks
11:00 am- 11:15 am	**Advances in Understanding the Neural Control of Fertility** Prof. Dr. Allan E. Herbison. (*University of Cambridge, UK*)
11:15 am- 11:30 am	**Biodegradation of Plastics: An Ecofriendly Waste Management Approach** Prof. Dr. Muhammad Ishtiaq Ali. *(Quaid-i-Azam University, Islamabad)*

Time	Oral Presentations
11:30 am- 11:40 am	**Evaluation of Antifungal Activities of different Fractions of *Monotheca buxifolia*.** Jan, S., Rashid, U., Khan, R. M., & Bokhari, J. *(Abasyn University, Islamabad)*
11:40 am- 11:50 am	**New records of *Anthaxia Eschscholtz*, 1829 (Coleptera: Buprestidae: Anthaxiini) from Pakistan**

	Fatima, N. *(Rawalpindi Women University, Rawalpindi)*
11:50 am-12:00 pm	**Journey towards Personalized Medicines and Rare Genetic Diseases Management**
	Mehmood, S. (*National University of Medical Sciences, Islamabad)*
12:00 pm-12:10 pm	**Navigating the Challenges of DNA Extraction from Soil-Soaked Blood Samples in Forensic Analysis"**
	Farooq, A. *(Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad)*
12:10 pm-12:20 pm	**Exploration of Spatial Variations and Correlations in Commercially Important Shrimp's Morphometric Traits**
	Noor, H. S., & Saher, N. U. *(University of Karachi, Karachi)*
12:20 pm-12:30 pm	**Shell Morphometry of Giant and Titan barnacle species *Megabalanus tintinabulum* and a new report: *Megabalanus coccopoma* from Rocky Shore of Karachi,Pakistan**
	Nasir, A., & Saher, N. U. *(University of Karachi, Karachi)*
12:30 pm-12:40 pm	**Fiddler crab *Uca iranica* and *Uca sindensis* as Bioindicator in Sea Sediments of Sandspit Backwater of Karachi, Sindh**
	Shahwar, D. E. & Saher, N. U. (University of Karachi, Karachi)
12:40 pm-01:00 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IIF
Zoology

Venue: Fatima Hall
Time: 01:45 pm - 03:45 pm

Themes: Genetics, Health Sciences, & Marine Biology

Chair: Prof. Dr. Irfan Zia Qureshi
Professor,
Quaid-i-Azam University, Islamabad

Co-Chair: Prof. Dr Muhammad Arif Nadeem Saqib
Professor,
National Skills University, Islamabad

Time	Keynote Talk
01:45 pm-02:00 pm	**Role of Research Innovation and Entrepreneurship in Knowledge Economy: Life Sciences**
	Prof. Dr. Muhammad Irfan Khan (*International Islamic University, Islamabad)*

Time	Oral Presentations
02:00 pm-02:10 pm	**Assessment of Major Stored Grain Insect Pests in Wheat: A Case Study in Punjab, Pakistan**
	Zain, M., Ajmal, N., Bodlah, A. M., Bodlah, I., Fareen, G. A., & Mudassir, A. M. *(PMAS-Arid Agriculture University, Rawalpindi)*
02:10 pm-02:20 pm	**New Locality Record of *Urentius hystricellus* (Richter, 1870) (Hemiptera: Tingidae) Associated with Egg Plant from Southernmost Region of Punjab, Pakistan**
	Fareen, G. A., Rasheed, T. M., Bodlah, I., & Bodlah, A. M., *(Rawalpindi Woman University, Rawalpindi)*
02:20 pm-02:30 pm	**Compare Bowen's Technique and Muscle Energy Technique on Hamstrings Tightness in Chronic Non-Specific Low Back Pain Patients: A randomized clinical trial.**

	Younis, A., Murad, S., & Waqqar, S. (*Foundation University, Islamabad)*
02:30 pm-02:40 pm	**Influence Of Vitamin D_3 and Calcium Oral Supplementation on The Circulatory Vitamin D_3 And Nutritional Status in Women of Different Professions**
	Ahmad, S., Ambreen, A., Ahmad, N., Gul, W. S., & Gul, W.S. *(Margalla College of Pharmacy, MIHS, Rawalpindi*)
02:40 pm-02:50 pm	**Effect of Coriadrum Sativum L. Leaves and Stems on Male Reproduction**
	Shams, S., Ambreen, F., & Ahmad, S. *(Margalla College of Pharmacy, MIHS, Rawalpindi)*
02:50 pm-03:00 pm	**Comparative Evaluation of different PCR Based Diagnostic Assays for Detection of *Mycoplasma gallisepticum***
	Farooq, S., Shah, A. A., & Naeem, K. *(Allama Iqbal Open University, Islamabad)*
03:00 pm-03:10 pm	**Frequency of Protracted Shoulders and its Relationship with Interscapular Distance and Thoracic Expansion in Healthy Young Adults.**
	Murad, S., Mazhar, M., Asim, A., Aziz, H., Sajjal, Z., Sajid, R., & Bakht, B. *(Foundation University, Islamabad)*
03:10 pm-03:20 pm	**Relationship Between Neck Pain, Sleep Quality, and Mindfulness in Undergraduate Medical Students**
	Khalid, Q., Abbas, S., Tahir, N., Khalid, S., & Rehman, A. *(Foundation University, Islamabad)*
03:20 pm-03:30 pm	**Salticidae (Jumping Spider) of Karachi Sindh Provience, Pakistan**
	Kazim, M., Perveen, R., Fatima, N., Begum, A. *(Education Degree College Danyore, Gilgit Baltistan*)
03:30 pm-03:45 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shields and Certificates Distribution

Session IH
Zoology

Venue: Room-33 Block A - Ground Floor

Time: 11:00 am - 01:00 pm

Themes: Entomology, Environmental Biology, & Physiology

Chair: Dr. Zaib Un Nisa

Associate Professor,
Government College University, Faisalabad

Co-Chair: Dr. Ghulam Murtaza

Assistant Professor,
University of Gujrat, Gujrat

Time	Keynote Talks
11:00 am-11:15 am	**Harmonizing Nanotechnology with Physiology: Exploring Synergies**
	Prof. Dr. Irfan Zia Qureshi. *(Quaid-i-Azam University, Islamabad)*
11:15 am-11:30 am	**Importance of Honey Bee and Basic Breeding Methods**
	Aziz GÜL. *Hatay Mustafa Kemal University, Antakya, Hatay, Turkey*

Time	Oral Presentations
11:30 am-11:40 am	**Intraspecific Morphometric Variation in the Tadpoles of Hazara Frog *Allopaa hazarensis* (Anura: Dicroglossidae)**
	Abid, A., Gill, S., Rani, A., Shah, G., Luqman, A.W., Maqbool, I., & Rais, M. *(PMAS-Arid Agriculture University, Rawalpindi)*
11:40 am-11:50 am	**Identification and Antibiotic Susceptibility Profiling of Bacteria Isolated from Backyard Poultry**
	Ibrahim, A., Riaz. A., & Baig, M. R. *(PMAS- Arid Agriculture University, Rawalpindi)*
11:50 am-12:00 pm	**Genetic Alteration in a Pakistani Piopulation with Breast Cancer**
	Ayesha, S. Q., Abbasi, A. S., & Baig, M. R. *(PMAS-Arid Agriculture University Rawalpindi)*

12:00 pm-12:10 pm	**Analysis of Mutational Profile of Breast Cancer Patients**
	BiBi, N. (*PMAS-Arid Agriculture University, Rawalpindi)*
12:10 pm-12:20 pm	**First Record of Chronoxenus wroughtonii (Hymenoptera: Formicidae) from Pothwar region of Pakistan**
	Fareen, A. G., Bodlah, A., M., Bodlah, I., & Rasheed, T., M. *(PMAS- Arid Agriculture University, Rawalpindi)*
12:20 pm-12:30 pm	**Homozygous Missense Variant in *SAMHD1* Gene Underlies Aicardi-Goutières Syndrome**
	Ullah, S., Jaan, S., Din, S. U., & Khan S. (*Kohat University of Science and Technology, Kohat*)
12:30 pm-12:40 pm	**Nested PCR Based Characterization of Infectious Bovine Rhinotracheitis Virus in Cattle and Buffaloes**
	Fatima, J., Riaz, A., Batool, N., & Mehmood, R. *(PMAS-Arid Agriculture University, Rawalpindi)*
12:40 pm-12:50 pm	**Morphological and Morphometric Analysis of *Euphlyctis Kalasgramensis* (Anura: Dicroglossidae) in Rawalpindi-Islamabad Area**
	Naz, H., Akram, A., Rais, M., Saleem, A. *(PMAS-Arid Agriculture University, Rawalpindi)*
12:50 -pm 01:00 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shield and Certificates Distribution

Session IIG
Zoology

Venue: Room-33 Block A - Ground Floor
Time: 01:45 pm - 03:45 pm

Themes: Fisheries & Health Sciences
Chair: Prof. Dr. Muhammad Irfan Ullah
Professor, *University of Sargodha, Sargodha*
Co-Chair: Dr. Zaib Un Nisa
Associate Professor *Government College University, Faisalabad*

Time	Keynote Talks
01:45 pm-01:55 pm	**Genetics Research and its Translation to Clinical Trials in Pakistan**
	Prof. Dr. Muhammad Jawad Hassan. *(Department of Biological Sciences, Islamabad)*
01:55 pm-02:05 pm	**Deciphering the Cis-regulatory Catalogue of zebrafish Endodermal Genes**
	Dr. Rashid Minhas. *(University of Exeter, UK)*

Time	Oral Presentations
02:05 pm-02:15 pm	**Prevalence of Gastrointestinal Parasites in Selected Population from Gujranwala, Pakistan**
	Irum, S., Ehsaan, A., Roshan, S., Shamas, S., & Faiz, M. *(University of Gujrat, Gujrat*)
02:15 pm-02:25 pm	**Evaluation of Co-Infection Dynamics of *Ornithobacterium rhinotracheale*, Avian influenza virus-H9, and Infectious *Bronchitis irus* in Poultry**
	Amjad, A., Siddique, N., Ali, A., Abbas A., & Naeem, K.(*Quaid-i-Azam University, Islamabad*)
02:25 pm-02:35 pm	**Investigating the Combined Medicinal Effects of *Withania Somnifera* (ashwaghandha) and *Murraya Koenigii* (curry pata) *in vitro***

	Roshan, S., Sughra, K., Shamas, S., Irum, S., Nisa, K., & Sadia, H. (*University of Gujrat, Gujrat)*
02:35 pm-02:45 pm	**Genetic Analysis Reveals a Rare DWR72 Gene Mutation Underlying Amylogenesis Imperfecta in a Pakistani Kindred**
	Jan, S., Ullah, S., Shah, S., Khan, N., Muhammad, N., Muhammad, N., Rehman, Z. U., & Khan, S. *(Kohat University of Science & Technology, Kohat, Khyber)*
02:45 pm-02:55 pm	**Antimicrobial Evaluation of Bacterial Isolates from Pus Samples in Khyber Teaching Hospital, Peshawar, Pakistan**
	Riaz, M., & Zahra, M. *(Shaheed Benazir Bhutto Women University, Peshawar)*
02:55 pm-03:05 pm	**Study of Effect of Antibiotics on Microbial Isolates from *Apis mellifera* Brood**
	Qamer, S., & Raza, T. *(Rawalpindi Women University, Rawalpindi)*
03:05 pm-03:15 pm	**Comparison of Physicochemical Characteristics of Honey Produced by *Apis florea* And *Apis dorsata* Honeybee species *from Pakistan***
	Qamer, S. & Sajid, M. (*Rawalpindi Women University, Rawalpindi)*
03:15 pm-03:25 pm	**Prevalence and Frequency of Parasitic Mite (*Varroa destructor*) in *Apis mallifera* Colonies**
	Qamer, S., & Jamal, U. *(Rawalpindi Women University, Rawalpindi)*
03:25 pm-03:45 pm	**Q & A Session** Session Concluding Remarks by *Session Chair and Co-Chair* Shield and Certificates Distribution

POSTER PRESENTATIONS
(11:00 am - 12:30 pm)

Posters Botany
Venue: Corridor- Block A, Ground Floor
Poster Judges

Dr. Sobia Nisa *Associate Professor,* *University of Haripur, Haripur*
Dr. Humaria Yasmin *Associate Professor,* *COMSATS University, Islamabad*

Poster Codes	Title
BOT-210	**Evaluation of Biological Activities and Nutraceutical Potentials of Selected Wild Vegetables**
	Afzal, T., Bibi, Y., Gilani, S. S., Naseem, K., & Jabeen, A. *(PMAS-Arid Agriculture University Rawalpindi)*
BOT-372	**Morphological and Biochemical Characterization of Carom (*Trachyspermum ammi* L.)**
	Nawaz, F., Malik, S., & Tahira, R. *(Rawalpindi Women University, Rawalpindi)*
BOT-374	**Morphological and Biochemical Characterization of Fennel (*Foeniculum vulgare* Mill.)**
	Muzaffar, A., Malik, S., & Tahira, R. *(Rawalpindi Women University, Rawalpindi)*
BOT-407	**Application of Bioinoculant as a Plant Growth Promoting Rhizobacteria (PGPR) for Sustainable Agriculture**
	Shoukat, K., Sherazi, I. N., Rizvi, Z. F., Qaiser, Z., Naz, I., Sultan, T., Sarwar, S., Tabassum, T. *(Government College Women University Sialkot, Sialkot)*
BOT-437	**Phytoremediation Capacity of *Alstonia scholaris* L. Plants Irrigated with Heavy Metals (HMs) Contaminated Wastewater**

	Nadeem, N., & Hyder, S. *(Government College Women University Sialkot, Sialkot)*
BOT-438	**Antifungal Activity of Some Fungicides and Plant Extracts for the Control of Chili Anthracnose**
	Fatima, S. N., Hyder, S., & Rizvi, Z. F. *(Government* College Women University Sialkot, Sialkot)
BOT-440	**The Impact of Co-Inoculation with Rhizobacteria and Organic Wastes on Enhancing the Plant Growth and Nutrient Uptake in *Zea mays* L.**
	Nisa, M. U., Hyder, S., Gondal, A. S., Rizvi, Z. F. *(Government College Women University Sialkot, Sialkot)*
BOT-526	**The Role of Innovative Agricultural Practices in Mitigating the Adverse Effects of Climate Change on Cereal Crops**
	Qaiser, Z., Khalid, N., Shuakat, K., Naz, I., & Riaz, Z. *(Government College Women University Sialkot, Sialkot)*
BOT-527	**Potential of Nanotechnology in Enhancing Crop Yield and Reducing Environmental Impact In Sustainable Agriculture**
	Naz, I., Munazir, M., Qaiser, Z., Shuakat, K., & Riaz, Z *(Government College Women University Sialkot, Sialkot)*
BOT-532	**Whole-Genome Sequencing of Medicinally Important *Artemisia scoparia* (Asteraceae)**
	Malik, S., & Yasmin, A. *(Rawalpindi Women University, Rawalpindi)*
BOT-557	**Isolation and Screening of Bacteria for Their Role in Oil Recovery and Metal Tolerance from Petroleum Reservoirs**
	Tayyaba, S., & Butt, A. *(Capital University of Science and Technology, Islamabad)*

Posters Chemistry
Venue: Gallery-2nd Floor Sheikh Rasheed Block

Poster Judges

Prof. Dr. Rohama Gill *Professor,* *Quaid-i-Azam University, Islamabad*
Prof. Dr. Muhammad Adil Mansoor Associate Professor *National University of Science and Technology, Islamabad*

Poster Codes	Title
CHM-01	**Doped NMC 811 as Efficient Cathode Materials for Lithium ion Batteries.**
	Ain, N., Rehman, Z., & Darr, J. A. (*Rawalpindi Women University, Rawalpindi)*
CHM-02	**Electrochemical Performance of Carbon Modified $LiNiPO_4$ as Li-Ion Battery Cathode: A Combined Experimental and Theoretical Study**
	Nasir, M. H., Janjua, N. K., & Santoki, J. *(Quaid-i-Azam University, Islamabad)*
CHM-03	**Generation of Molecular Imprinted Polymer Based Artificial Receptor for the Detection of Organochlorine Pesticides**
	Asghar, N., & Mustafa, G. *(University of Okara, Okara)*
CHM-04	**Haematite-loaded Rice Husk Biochar Nanosorbent to Remove Chromium from the Aqueous Media**
	Iqbal, T., Batool, F., & Iqbal, S. *(Rawalpindi Women University, Rawalpindi)*
CHM-05	**Synthesis, and in Silico Guided Biological Evaluation of Triazole- Azomethine Conjugates**

	Zafer, F. *(Rawalpindi Women University, Rawalpindi)*
CHM-06	**Synthesis, *in vitro* a-glucosidase Inhibitory Potential and Molecular Docking Study of Thiadiazole Analogs**
	Akhter, B. *(Rawalpindi Women University, Rawalpindi)*
CHM-07	**Autosomal Recessive Transmission of a Rare HOXC13 Variant Causes Pure Hair and Nail Ectodermal Dysplasia**
	Mehmood, S., Raza, S. I., Bokhoven, H. V., & Ahmad, W. *(Quaid-i-Azam University, Islamabad)*
CHM-08	**Fabrication of Magnetic and Non-magnetic Fe-doped Metal Sulphide for Environmental Protection.**
	Mughal, A. A., & Ain, N. *(Rawalpindi Women University, Rawalpindi)*
CHM-09	**Cs4FeBiBr10: An Example of a New-Type A4BB′X10 Lead-Free Metal Halide Perovskite Single Crystal**
	Usman, M., & Qungfeng, Y**.** *(Tsinghua University, China)*

Posters Physics
Venue: Sheikh Rashid Block, Ground Floor

Poster Judges

Dr. Hafsa Faiz *Assistant Professor, Lahore Garrison University, Lahore*
Dr. Muhammad Waqar Ahmed *Assistant Professor, Riphah International University*

Poster Codes	Title
PHY-001	**Characterization of $BiMnO_3$ for Multiferroic Applications**
	Arooj, A., Niaz, H. A., Arif, S., Ijaz, B., & Parveen, B. (*Rawalpindi Women University, Rawalpindi)*
PHY-002	**Numerical Investigations on Feasibility of Inorganic $KSnBr_3$ Perovskite Absorber for Solar Cells**
	Din, M., Qasim, I., & Mumtaz, M. *(Riphah International University, Islamabad)*
PHY-003	**Synthesis and Structural Study of ZnO with Nano-rod like Surface Morphology**
	Rubab, K., Fajar, R., Awan, A. M., & Parveen, B. (*Rawalpindi Women University, Rawalpindi)*
PHY-004	**Designing Spray Pyrolysis Set-up for Fabrication of Thin Film**
	Sajjad, Z., & Parveen, B. (*Rawalpindi Women University, Rawalpindi)*
PHY-005	**Performance Evaluation of $Ito/Tio_2/Ch_3nh_3sni_3/Nio/Au$ Perovskite Solar Cell**
	Bokhari, S., & Fayyaz, M. *(Riphah International University, Islamabad)*

PHY-412	**Implementation of Arduino based Data Logging System in Industries**
	Kazmi, A. (*Rawalpindi Women University, Rawalpindi)*
PHY-334	**Smart Car Parking System**
	Noor, R. (*Rawalpindi Women University, Rawalpindi)*
PHY-348	**Bluetooth Controlled Robot**
	Ali, A., Batool, L., Waqar, S., Nazir, H., & Zahra, S. (*Rawalpindi Women University, Rawalpindi)*
PHY-339	**Smart Stick for Blind People**
	Naheed, I., Sameen, D., Asim, A., & Sajjad, U. (*Rawalpindi Women University, Rawalpindi)*
PHY-006	**Bidirectional Visitor Counter**
	Mursaleen, S., & Bintay Naveed, N. (*Rawalpindi Women University, Rawalpindi)*
PHY-347	**Line Follower Robot**
	Kiran, M., Irfan, I., Ehsan, J., & Pervaiz, N. (*Rawalpindi Women University, Rawalpindi)*
PHY-407	**Home Automation using Bluetooth Module (HC05)**
	Zainab, S. (*Quaid-i-Azam University, Islamabad*)
PHY-360	**Blood Oxygen and Heart Rate Monitoring System**
	Alishba, H., Muqadas., & Kausar, F. (*Rawalpindi Women University, Rawalpindi)*
PHY-346	**Wireless Notice Board**
	Arif, S., Irfan, L., Asghar, A., & Hamid, W. (*Rawalpindi Women University, Rawalpindi)*
PHY-44	**Contribution of the Generalized (r, q) Distributed Electrons in the Formation of Nonlinear ion Acoustic Waves in Upper Ionospheric Plasmas**
	Ali, S. *(Quaid-i-Azam University, Islamabad*)
PHY-408	**A Novel and Diverse Pest Detection and Classification System using Deep Learning Techniques**
	Abbas, M. J., Khan, H. S., Qadeer, I., Hijab, M., & Hassan, N. (*HITECH University, Taxila)*
PHY-409	**Quantum Walks with Bipartite Entangled Coins**
	Arshad, S. *(National University of Science and Technology, Islamabad)*

Posters Zoology
Venue: Corridor- Block A, 1st Floor

Poster Judges

Prof. Dr. Muhammad Arif Nadeem Saqib *Professor,* *National Skills University, Islamabad*
Dr. Tariq Mahmood *Associate Professor,* *PMAS Arid Agriculture University Rawalpindi*
Dr. Ahmed Farooq *Assitant Professor,* *Shaheed Zulfiqar Ali Bhutto Medical University PIMS, Islamabad*

Poster Codes	Title
ZOO-001	**Study of A Genetic Variation among Patients of Breast Cancer in A Pakistani Population**
	Ghazanfar, B., Baig, M. R., Irfan, M., & Riaz, A. *(PMAS-Arid Agricultural University, Rawalpindi)*
ZOO-002	**Effect of Hyperglycemia on Renal Function**
	Ambreen, F., Javed, S., & Noor, L. (*Rawalpindi Women University, Rawalpindi)*
ZOO-003	**Mechanism of Narcotic Addictions and Innovative Treatment by Injectable Hydrogel for Sustained Release of Antinarcotic drugs**
	Aftab, M., Javed, F., Rehman, S. U., Shah, A. N., Hamid, A., & Ullah, F. *(National University of Medical Sciences, Rawalpindi)*
ZOO-004	**Effect of COVID-19 on Fisheries and Aquaculture Industry in Pakistan and the Mitigation Measures**
	Bibi, S., Ejaz, R., & Akhter, S. *(Rawalpindi Women University, Rawalpindi)*
ZOO-005	**Potential of Poultry by-product Meal as a Fishmeal Alternative in Aqua Feed: A Review**

	Maryam, H. Z. S., Fatima, M., & Nadeem, H. *(University of Gujrat, Gujrat)*
ZOO-006	**Monitoring Insecticide Resistance and Associated Fitness Cost in Field Evolved Resistant Population of *Plutella xylostella* an Overview of Pakistan**
	Shehzad, M., & Tariq, M. *(PMAS- Arid Agriculture University, Rawalpindi)*
ZOO-007	**First Record of *Podagrion pachymerum* (Walker 1833) (Hymenoptera: Torymidae) from Pakistan**
	Asghar, N. Y. M., Bodlah, A. M., Bodlah, I., Fareen, A. G., Nissar, A. M., & Rehman, A. U. *(PMAS- Arid Agriculture University, Rawalpindi)*
ZOO-008	**Removal of Nickel from Contaminated Water by Using Bacterial Biofiltration**
	Kalsoom, U., Idrees, M., Ghazanfar, U., Haq, Z., & Shahid, S., *(University of Wah, Wah Cantt)*
ZOO-009	**Protein Variability of the Two Species of Stomatopods from family Squillidae *Clorida latreillei* and *Oratosquilla hesperia* from the Karachi Coast, Pakistan**
	Saher, N. U., & Zaheen, M. W. *(University of Karachi, Karachi)*
ZOO-010	***Elasmobranch* species Recorded at Karachi Fish Harbour during the Baseline Surveys (2014-2019): a Review of Several Biological Elements with a few Public-attribute Trends**
	Nasir, R., Afsar, N., & Saher, N. U. *(University of Karachi, Karachi*)
ZOO-011	**An Experimental Study on the Diversity of Diatoms with Relation to the Presence of Microplastics from the Sonmiani Bay, Pakistan**
	Shah, M., & Saher, N. U. *(University of Karachi, Karachi)*
ZOO-012	**Estimation of Air Pollution Associated with Cement Industry**
	Raja, M., Idrees, M., Ghazanfar, U., & Haq, Z., *(University of Wah, Wah Cant)*
ZOO-013	**Bioremediation Potential of Indigenous Bacterial Isolates for the Removal of Chromium from Contaminated Water**

	Rasheed, U., Idrees, M., Ghazanfar, U., & Haq, Z. *(University of Wah, Wah Cantt)*
ZOO-014	**Assessment of *Saccharum Arundinaceum* For its Cytotoxic Potentials**
	Rashid, Q., & Khan, S. *(Abasyn University, Islamabad)*
ZOO-015	**Determination of Antibacterial Activities of Methanolic Extract of *Elymus repens*.**
	Rashid, U., Jamshaid, M., Butt, A. Z., Munazir, M., & Qureshi, R. *(Abasyn University, Islamabad)*
ZOO-016	**Health Related Quality of Life among Women with Polycystic Ovarian Syndrome Visiting Tertiary Care Hospitals of Rawalpindi City**
	Jamshaid, F., Ahmad, S., & Azad, S. (*Margalla Institute of Health Sciences, Rawalpindi*)
ZOO-017	**Removal of Lead from Contaminated Agricultural Soil by Using Selected Bacterial Isolates**
	Amer, A., Idrees, M., Ghazanfar, U., & Haq, Z. *(University of Wah, Wah Cantt)*

ABSTRACTS
INVITED
KEYNOTE TALKS

BOTANY

Role of Endophytic Bacteria in Promoting Plant Growth and Sustainability

Prof. Dr. Azra Yasmin

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Abstracts-Microorganisms associated with the plants are diverse in nature and provide various benefits. Endophytic bacteria impact plant growth by enhancing plant biomass, yield, fruits, grains etc on one side and protecting them from various abiotic and biotic stresses on the other hand. This is because of the metabolites produced by endophytic bacteria. Enhanced nutrients' uptake, production of useful compounds such as biofertilizers, production of hormones, reducing the effect of various pollutants and displaying antagonistic characters for pathogens are various outcomes of these metabolites. Generally, endophytes colonize themselves in inter- or intra-cellular spaces or in the vascular tissues of plants. Endophytic bacteria are grouped according to the different internal mechanisms used to colonize the plants. Now a day, endophytic bacteria are center of attention for biotechnologists because of their potential in enhancing the plants growth and sustainability of environment. Here we will be discussing various applications of endophytic bacteria with a futuristic approach.

Keywords: Role of Endophytic Bacteria in Promoting Plant Growth and Sustainability

Hemp (*Cannabis sativa*) as a natural nematicide against root-knot nematodes (*Meloidogyne incognita*)

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Due to their high cost and detrimental impact on the environment and human health, the use of nematicides has become prohibitive in many countries. As an attractive alternative, the management of plant-parasitic nematodes through antagonistic plants has gained considerable interest. This study aims to assess the effectiveness of aqueous extracts of Cannabis sativa at various concentrations, namely S, S:1, S:5, S:10, S:25, S:50, and S:100, on the hatching, mortality, and infectivity of Meloidogyne incognita. This nematode species is responsible for substantial yield losses in cucumber and is among the most devastating root-knot nematodes. The results indicate that the extracts exhibited significant effects on juvenile mortality and hatching inhibition in a dose-dependent manner. Furthermore, the duration of exposure significantly impacted mortality and hatching inhibition. Various treatments with the extracts led to a notable inhibition of the invasion of M. incognita juveniles on cucumber cv. Royal Sluis. Exposure to "S" extracts of C. sativa for 24 and 48 hours resulted in no infection, while exposure for 12 and 6 hours caused reductions in infectivity exceeding 95% and 90%, respectively. Similarly, both soil drench and root dip treatments led to significant reductions in infection. The efficacy of C. sativa leaves was also evaluated by incorporating them into the soil at rates of 0, 2, 4, 6, 8, 10, and 20 g/Kg of soil. C. sativa exhibited a considerable reduction in nematode infestations and notably enhanced plant growth criteria compared to the untreated check. The highest

reductions in the number of galls, egg masses, nematode fecundity, and overall nematode build-up were observed with the 20 g dosage. These findings underscore the significant potential of locally abundant C. sativa for controlling root-knot nematodes and suggest that it could serve as a viable substitute for synthetic nematicides.

Traditional Plant Knowledge from People to the Society. Aims, Approaches and Achievements of Ethnobotany

Prof. Dr. Joan Vallès Xirau

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Abstracts- From the origins of the humanity, people named, used and managed plants, starting from those closer to their territories, then enlarging to others not so closely reachable, including cultivation, domestication and commerce. Food, medicine and all other areas of human life are concerned by this activity. Through the centuries, an enormous pool of popular knowledge related to plant biodiversity has been accumulated in any geographical and cultural territory, maintaining old acquisitions and, whenever necessary, updating them with novel ideas. This called traditional botanical (or, more generally, biological or ecological) knowledge is a biocultural quality of our societies, with both originality in each place and a degree of convergence among some of them. It has the added value of concerning at the same time biological and cultural heritages, making it a treasure of nature and culture. This folk use of remain resources remains local in some cases but has allowed the generalization and the commercialization of many very important products for human wellbeing and development. In many rural areas

around the World, this knowledge is largely maintained, but, in many industrialized ones, it is highly eroded, often becoming residual, more or less endangered or at least partly disappeared. This is why it is urgent to collect this information in order it is not lost and it can be reintroduced to the society from which it comes, the latter being one of the ethical duties of the researchers in this discipline. The reach of ethnobotanical research is large, from ethnofloristic work to inventory the useful plants of one territory, to meta-analytic investigations of many different aspects or monographic studies on plants groups or on use groups. In the last years, phytochemical and molecular approaches propose to associate ethnobotanical knowledge with chemical data that could confirm plants uses recorded and with phylogenetic information in order to detect hot taxonomic nodes for one or another plant use. In the present lecture, we will present ethnobotany, its state-of-art, with the main approaches to its research, and some of its achievements and its possibilities for the future.

Keywords: Ethnobotany, People, Aims, Approaches, Achievements

Interdisciplinary Approaches in Biological Sciences to Sustainable application for Alternative Biomass Energy, Food and Health

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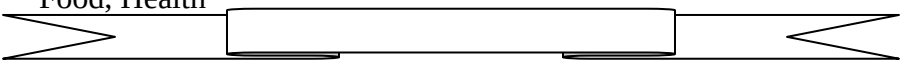
Abstract: Energy, food and health are three important basic necessities of life. In current era due to fast climatic changes the energy, food and health security are important topics of discussion around the world and Pakistan particularly. Scientists in the World

exploring alternative energy, food and health resources for sustainable development. Innovations and emerging technologies are the solution to find out sustainable utilization of plant diversity. Pakistan is host to three of the world's biggest and most spectacular mountain ranges, the Himalaya, the Karakoram and the Hindukush (HKH). This project confined to explore the commercial products obtained from plant diversity which play an important role in socio-economic welfare and sustainable development of livelihood in Pakistan. This area is endowed with a great diversity of flora and fauna due to variations in altitude, rainfall, and climate. The native communities have centuries old knowledge about the plant resources utilization and depends upon directly or indirectly on these resources to meet their daily needs in the form of biomass energy, biofuels, nutraceuticals, pharmaceuticals, vegetables, fruits, medicines, wood, timber, fodder, nuts, honey, spices, food and many other NTFPs. Currently, biodiversity in this region is strongly influenced by dynamic climatic changes like rise in global temperature, pollution, fluctuation in rainfall, population pressure, agricultural expansion, deforestation, extensive livestock grazing, resource demand, and commercial timber extraction that intensify the rates of habitat loss, habitat degradation, and wildlife exploitation. Species richness and threats suggest that this area needs strong and prompt conservatory management of biodiversity. The study recommends the development of national parks, wildlife sanctuaries, botanical gardens and herbaria based on in-situ and ex-situ conservation strategies in in Northern areas of Pakistan to protect regional biodiversity for global acceptance. Indeed, conservation of biodiversity is fundamental to achieving sustainable development in this area particularly and world generally. Maintaining biodiversity is not only crucial for the sustainability in agriculture, energy, forestry, fisheries, wildlife, tourism, health, irrigation and power sectors Pakistan, but is also lifeline for the downstream people in other parts of Pakistan.

Keywords: Interdisciplinary, Biological Sciences, Biomass Energy, Food, Health



CHEMISTRY

Integrated Energy Systems: From Materials to Technology

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Abstract- An overview of the technologies will be provided in this talk focusing on the very concepts of energy collection, energy storage and energy transfer in light and charge driven materials, devices and circuits for versatile integrated energy systems. The verticals of the energy hybrids will be revisited in order to evaluate their current status, research outcomes for their usage in next-generation applications and their level of readiness for possible exploitation in industry. The verticals of energy hybrids would include, but not limited to, next generation solar cells, future batteries, energy harvesters, supercapacitors and electrochromic devices. Some of the latest and promising research conducted in the Centre for Advanced Electronics & Photovoltaic Engineering, on this account, will also be shared.
Keywords: Integrated, Energy Systems, Materials

Current Status and Future Perspectives of the Platinum-based Anticancer drugs

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Abstract- Following the accidental breakthrough of cisplatin, numerous analogues have been prepared and some of them, namely carboplatin, oxaliplatin, nedaplatin, heptaplatin and lobaplatin, have received clinical status either locally or worldwide. Despite their

high anticancer action, there are some unwanted issues like low cellular uptake, diversion to off-target biomolecules, nephrotoxicity and resistance are related to them. These problems originate from their square planar structure (susceptible to nucleophilic attack), high affinity of platinum (II) for sulfur donor bioligands, and formation of a repairable bifunctional adduct with DNA. To overcome the foregoing problems, new ternary platinum (II) complexes, also called monofunctional complexes, have been prepared and assessed for their anticancer ability. Owing to their unique structural design and dissimilar mechanism of action, the complexes were found several times more active than cisplatin (Fig. 1).

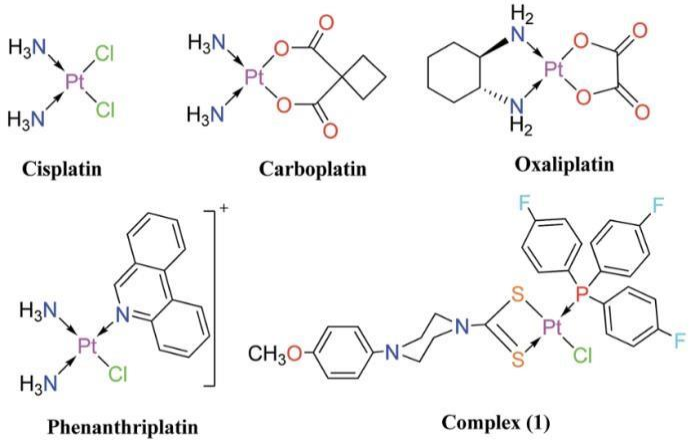

Fig. 1 Structures of bifunctional (upper) and monofunctional platinum (II) complexes (lower)

Keywords: Platinum, Anticancer, Drugs

Smart Polymer Microgels and Hybrid Microgels for Environmental and Catalytic Applications

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Abstract- Synthesis and characterization of smart microgel particles have gained a lot of consideration in last two decades due to their potential applications in various fields including nanotechnology, catalysis and environmental science. Our group has reported different microgel systems with different morphologies for in-situ fabrication and stabilization of metal nanoparticles. The homogeneous microgel particles were obtained by a single step process of free radical precipitation polymerization. However, core-shell microgel particles were obtained by two step precipitation polymerization method. We have also developed a single step method to obtain core shell microgel particles. Metal nanoparticles were loaded into the microgel system by reduction of metal ions inside the polymer network. Both pure and hybrid microgel systems were characterized by UV-Visible spectroscopy, Fourier transform infra-red spectroscopy, X-ray diffraction, thermo-gravimetric analysis and transmission electron microscopy. Microgel particles were used as adsorbent for removal of heavy metal ions from waste water. Catalytic activity of the hybrid microgels was investigated by carrying out the reduction of various nitroarenes and organic dyes in aqueous medium in the presence of the hybrid system. Catalytic activity of the smart hybrid microgel systems was found externally tunable by changing the pH and temperature of the medium. Catalytic system was found to be recyclable and may be used for other organic transformations in aqueous medium.

Keywords: Smart Polymer, Microgels, Hybrid Microgels, Catalytic Applications

Polymeric Materials and Their Use in the Biomedical, Environmental, and Energy Field

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Abstract- Scientific research is progressing rapidly on a global scale in line with increasing needs. The increasing number of people day by day brings with it the need for new devices, new methods or new materials. At this point, versatile materials come to the fore. For this purpose, scientists want the materials they will use in their research to be easily accessible and affordable.

It is meaningless to discuss the importance of water for the continuation of life on earth. For this reason, it is vital that all living things have access to clean water resources. However, today, water pollution is increasing due to the increase in industrial activities. Scientists are also looking for various solutions to this problem.

The rapidly increasing world population and developing industry cause an increase in energy consumption. This situation triggers the dependence on non-renewable energy sources and as a result, there is a serious increase in environmental problems. With these increasing problems and decreasing fossil fuels, it is necessary to find alternative energy sources. In this context, sustainable, low-cost, environmentally friendly, clean energy sources have become important for all countries. In recent years, hydrogen, which has been the subject of scientific news as the fuel of the future, has attracted the attention of researchers as a green energy carrier.

Polymeric structures prepared from natural or synthetic materials are indispensable structures for the biomedical, environmental and energy applications. Especially with its 3D structure, its ability to be prepared in different morphologies, and its application-specific

modification, polymers are in the focus of study of scientists with increasing interest day by day. Commercial or synthetic monomers, natural polymers were used as starting materials, and polymers of different sizes and morphologies in the new 3D structure were prepared with different polymerization techniques. Additionally, the prepared polymeric structures were subjected to modification reactions to introduce new functional groups via protonization, quaternization, and ion exchange reaction to prepare new structures with different characteristics and functional groups.

It has been demonstrated that the synthesized polymers are suitable for use in biomedical field as a carrier in controlled drug/biomolecule transport and release, biocompatible and antimicrobial materials, use in the environmental field as an adsorbent to remove toxic metals, dyes and organic pollutants from aqueous environments and in energy field as a metal free catalysts for H_2 productions from the methanolysis of sodium borohydride ($NaBH_4$) and template for metal catalyst preparation use in hydrolysis of $NaBH_4$.

Keynote Topic: Sodium Borohydride, Synthesized Polymers Biomedical, Environmental, Energy Field

MATHEMATICS

Beyond Fourier's Law: MHD Peristalsis

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Abstract- Energy equations beyond Fourier's law of heat conduction will be addressed. An application of such aspects for Peristalsis will be explored. Comparative study and significance of such consideration in the regime of nanomaterials will be examined. Important points for the considered activity will be shared.

Keywords: Fourier's law, Peristalsis, nanomaterials

Modeling and Numerical Simulation of Non-Newtonian Arterial Blood Flow for Mild to Severe Stenosis

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Abstract- The fundamental cause of coronary heart disease is thought to be atherosclerosis. Blood flow in arteries under plaque formation is widely studied using both experimental and theoretical methods in literature. An analysis is performed for four forms of stenosis, 50%, 60%, 70%, and 80%, which are defined by a narrowing of the artery's diameter. The mathematical model for non-Newtonian fluid transport is presented in the form of highly nonlinear coupled partial differential equations. A finite-volume approach is used to solve the system of equations numerically.

Keywords: Modeling, Simulation, Non-Newtonian, Blood Flow, Stenosis

Numerical Solutions of Some Fractional Differential Equations with Different Kernels

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Abstract- Fractional calculus finds applications in various fields, including physics, engineering signal processing, and control theory. It provides a more accurate representation of many natural phenomena and allows for a deeper understanding of systems with memory or long-range dependencies. We consider some differential equations in this work. We apply some numerical methods to get the numerical solutions of these equations. We demonstrate the numerical simulations by some figures.

Keywords: Fractional calculus, numerical simulations

PHYSICS

Science, Technology, and Innovation in the Islamic Countries: Status, Prospects, and Challenges

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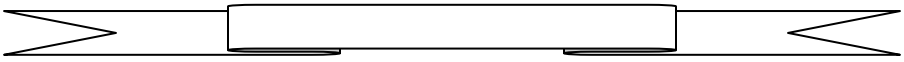
Abstract: In this lecture, we will review some of the basic parameters of scientific and technological quality and productivity of Islamic States, with a view to understanding their status amongst other nations. We also discuss the major steps being undertaken and the challenges confronting Islamic states in their effort to contribute to scientific and technological advances, as well as in the harnessing of technology for their economic development and social uplift. We suggest that while there appears to be a systematic trend in the past fifteen or twenty years of enhanced focus towards science and technology, there also appear to be deep routed weaknesses in the social and economic systems of these countries, which impede the efforts for scientific development. There is a dire need, we think, to develop merit-oriented systems in these societies that allow intellectual freedoms, if they are to be able to harness the undeniable talents within them and contribute toward science and technology, in proportion to their populations. Similar conclusions can be drawn with regard to the need and the development of innovative activities in these countries. There appears a broad realization of the need to encourage innovation and initiative amongst the youth, manifested in the growing culture of technology parks, incubation centers and the various incentives therein. However, for these promising developments to make a significant impact in these societies there will be a need to promote a culture of national self-reliance and indigenous problem solving.

Finally, we notice that rapid transformation are required in the educational system to focus on imparting valuable, contemporary skills and critical and independent thinking ability within a merit

oriented reward system. If such is not done, the coming years of the 4th Industrial Revolution, led by Artificial Intelligence, may find most of the Islamic countries marginalized even further, scientifically, and rendered even more irrelevant to the cultural and technological advancement of the world.

Keywords: Innovation, collaboration, capacity building



Revamping Humanity: The Evolution of Man-Made Materials

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Abstract: The Evolution of Man-Made Materials" presents a compelling narrative of how materials science has ushered in an era of unprecedented innovation and transformation. As we conclude this exploration, it is evident that man-made materials have become the backbone of modern civilization. From the microscopic wonders of nanotechnology to the artificial intelligence-infused intelligence of smart materials, these creations are poised to redefine what is possible in fields as diverse as healthcare, transportation, and environmental conservation.

One of the standout achievements of man-made materials is their contribution to sustainability. The capacity to engineer materials with remarkable strength, durability, and environmental responsibility promises to mitigate some of the most pressing challenges facing humanity today. Whether it's the development of energy-efficient building materials or advanced recycling technologies, these innovations offer a glimmer of hope for a more sustainable future.

In the grand tapestry of human progress, "Revamping Humanity: The Evolution of Man-Made Materials" serves as a testament to our capacity to reshape the world around us. It underscores the need for

continued investment in research and development, as well as the importance of education to prepare the next generation of innovators and scientists. Man-made materials are not just a scientific marvel; they are a call to action—a call to navigate the evolving landscape of technology with wisdom and responsibility.

As we stand on the precipice of an era defined by man-made materials, it is up to us to ensure that this revolution serves as a force for good, enhancing the quality of human life while preserving the delicate balance of our planet. With the right combination of innovation, ethics, and global collaboration, we can truly revamp humanity and steer it toward a brighter, more sustainable, and inclusive future.

Keywords: Man-Made Materials, human life, technology

Topological Materials

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Abstract: Physics has benefited greatly from ideas that were independently developed in mathematics. Topology is a branch of mathematics that studies shapes. Properties that do not change under continuous deformation, including stretching and bending, are topological in nature. Now some of these topological ideas have become important in several areas of physics. In this talk, I will begin with an introduction of topological phases of matter in free fermionic systems. I will focus on topological phase transitions and transport in topological materials and some of our results in this area.

Keywords: Topology, phases of matter, phase transitions

Dielectric Materials for Electrical Energy Storage

Dr. Vladimir V. Shvartsman

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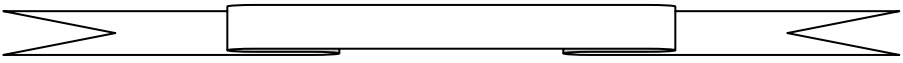
Abstract: Nowadays, the development of portable electronic devices, electric vehicles, etc. has caused a boom in research aimed at creating high-capacity electrical energy storage devices. Although dielectrics are still inferior to ion batteries or supercapacitors in terms of stored energy density, they significantly outperform them in terms of charge or discharge rate, which allows significant power output to be achieved. In recent years, there has been a resurgence of interest in ferroelectric materials for energy storage devices. Research is focused on both the search for new materials and the optimization of their microstructure in order to increase the dielectric breakdown strength. In particular, relaxor ferroelectrics are of the greatest interest because of large recoverable energy storage density and low hysteresis losses.

This lecture will overview the requirements for dielectric materials for high energy storage and present our recent results on two different families of materials. One family includes ceramics based on environmentally friendly $BaTiO_3$-$BaZrO_3$ relaxor ferroelectrics. The alloying with $BiMeO_3$ (where Me = Zn^{2+}, Nb^{5+}, Ta^{5+}, Y^{3+}, etc.) tunes the electrical properties and promotes relaxor behavior. In addition, the chemical modification has an impact on the transition temperature and shifts the peak permittivity to the desired operating window near room temperature. We discussed the role of different Me-cations on the energy storage parameters and the dielectric breakdown strength.

The second family belong P(VDF-TrFE-CFE) polymer relaxor materials. Here we have studied the effect of the CFE content on the relaxor behavior and the energy storage performance. It is shown

that in composites with P(VDF-TrFE-CFE) polymer matrix and BaZr0.2Ti0.8O3 dielectric inorganic nanofillers, a further increase in the stored energy density can be achieved. The mechanisms of this enhancement are discussed.
Keywords: Dielectric materials, $BiMeO_{3,}$ Relaxor Ferroelectrics



STATISTICS

Forecasting Consumer Price Index with FOMC Sentimental Index

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Abstract- The Federal Open Market Committee (FOMC) is a component of the Federal Reserve System responsible for overseeing open market operations. The FOMC meets roughly 8 or more times per year to assess the economy of the United States. After each meeting, the FOMC releases a statement to the press outlining its assessment of the U.S. economy and its monetary policy stance. The sentiment of these statements may have an influence on the U.S. economy and financial markets. Using sentiment and correlational analyses, this research examines how the sentiment of these statements affects the U.S. economy and financial markets by analyzing how FOMC statement sentiment is correlated with the Consumer Price Index (CPI), the National Financial Conditions Index (NFCI), and the Adjusted National Financial Conditions Index
(ANFCI). We find evidence to suggest that there is a moderate negative correlation between an FOMC statement's sentiment, and the United States City Average CPI value associated with the month before and the month after the statement's release. We also find that there is no evidence to suggest there exists a correlation between an FOMC statement's sentiment and the NFCI value associated with the week before or the week after the statement's release. However, we do find evidence to suggest that there is a moderate negative correlation between an FOMC statement's sentiment and the ANFCI value associated with the week before and the week after the statement's release. We also found that out of the three models we tested (linear regression, Vine copula regression, and Gaussian copula regression), the Gaussian copula regression model performs the best when forecasting the CPI and the ANFCI. Additionally, we

find that when forecasting CPI values, the models that include FOMC statement sentiment are more accurate than the models that exclude FOMC statement sentiment.

Keywords: Forecasting, Consumer, Price Index, FOMC Sentimental Index

Machine Learning and its Applications

Prof. Tahir Mehmood

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Abstract- The enhancement in technology is producing modern data sets, where the role of Statistical learning is getting enhanced. Statistical learning is a framework for understanding data based on statistics, which can be classified as supervised or unsupervised. In supervised learning the statistical model is trained with the objective to predict the test data, hence this area covers the regression and classification-based problems. While in unsupervised learning where statistical model is not trained over the data but is used to structure and sturdy the variation, this area is covers the clustering and dimension reduction problems. In modern data sets, it mostly happen to have massive amounts of information in the form of multiple variables per object, where traditional statistical methods gets failed. Modern statistical learning methods are devised for high-throughput data. The use of statistical learning in different fields has been increased in recent years to solve the variety of problems. This work will introduce the audience with statistical learning, modern development of methods together with their applications covering genomics, chemometrics, neuroinformatics, industrial process, computer vision, econometric, environmental studies, and so on.

Keynote Topic: Machine Learning, statistical model

ZOOLOGY

Advances in Understanding the Neural Control of Fertility

Dr. Allan E. Herbison

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Abstract- The brain has a key role in driving and regulating the fertility of all mammals. This occurs through a neural network located in the hypothalamus. This network is comprised primarily of the gonadotropin-releasing hormone (GnRH) neurons and two different episode generators: the arcuate nucleus pulse generator and the preoptic area surge generator. Amazingly, both of these episode generators use the neuropeptide kisspeptin to control the activity of the GnRH neuron. Many new neuroscience techniques are now available to interrogate the functioning and activity of the different neuronal cell types involved in the fertility network. This talk will focus on the use of GCaMP fibre photometry approaches that enable the activity of specific cell populations to be monitored in vivo in real time in freely behaving mice.

Keywords: gonadotropin-releasing hormone, neuroscience, fertility

Biodegradation of Plastics: An Ecofriendly Waste Management Approach

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Abstract- Plastics are high molecular weight polymers. Considering the increasing load in the environment, biodegradation of plastics by microorganisms and enzymes seems to be the most effective process. Oxidative enzymes play significant role in biodegradation of recalcitrant materials. Fungi are important among microorganisms for the production of extracellular enzymes.

Limited production and slow release of the particular enzymes are the limiting factor. The study was aimed for enhanced production, molecular characterization of oxidoreductases for plastic biodegradation. Molecular examination as well as the heterologous expression of ligninolytic enzymes i.e. laccase and lignin peroxidase were carried out. These enzymes are mainly produced under nutrient starved condition i.e. carbon or nitrogen limited medium. Microscopic examination of these enzymes producing organism showed that they are filamentous, coenocytic, aseptate and spore producing organisms. An experiment was set up by adding the PVC polymer in the MSM media and inoculating the respective enzymes after screening and purification. The Fourier transform infrared (FTIR) spectroscopy and Scanning electron microscopy (SEM) results of enzyme treated plastic films revealed the structural changes as compared to control (without enzyme treatment). Enzyme assay of both enzymes such as laccase and lignin peroxidase were carried out with vertryl alcohol and DMP as substrates. Current study results suggested, that Microorganisms have the potential for biodegradability of recalcitrant plastic waste and can be used for bioremediation at large scale

Keywords: Biodegradability, Lignin peroxidase, FTIR

Role of Research Innovation and Entrepreneurship in Knowledge Economy: Life Sciences

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Abstract- The social theory of a "knowledge society" explains how knowledge is fundamental to the politics, economics and culture of modern society. Associated ideas include the "knowledge economy" created by economists and the "learning society" created by educators. Knowledge has become a commodity to be traded for economic prosperity. The economy in

which the production of goods and services are primarily based on knowledge-intensive activities. In knowledge economy, a large portion of economic growth and employment is a result of knowledge-intensive activities. Any activity that involves the collection and analysis of data, synthesis of information, innovation and understanding the context is Knowledge-intensive activity. In the past century, the life sciences have contributed a lot to the development of Agricultural Economy. In the past three decades, the life sciences have become increasingly relevant to commerce and society, catalyzing the development of an entirely new industry- the Biotech Industry and contributed in Industrial Economy. Now the IT based Knowledge Economy is succeeding industrial economy, the Biotechnology and Biocomputing has to play there in the development of Knowledge Economy. Pakistan with unique genetic resources in human population, crops and other species provides opportunities for research and development of crop varieties resistant to various stresses. In certain areas like drug development, protein expression assays, population genetics and clinical trials, the expertise in Biocomputing can be utilized to develop business for service provision. At the moment, most researchers are not tapping their potential in knowledge-based economy due to lack of awareness, interest, or absence of IT and management support system. This trend is detrimental to academic research as well. This paper will present the argument that transforming research into policy is the basis for Knowledge Economy, where we find a gap between research findings and policy making. Therefore, integrating research findings into policy making process and to communicate research findings to policymakers is a key challenge for developing knowledge economy in Pakistan.

Keywords: knowledge society, learning society, research innovation

Harmonizing Nanotechnology with Physiology: Exploring Synergies

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Abstract- By integrating nanotechnology into the realm of physiology, we can explore the potential for a synergistic partnership. Nanotechnology, while having its focus on manipulating materials at the nanoscale, can be seamlessly merged with the field of physiology, which delves into the intricate functioning of living organisms, encompassing cells, tissues, organs and clinical medicine. This integrative approach aims to unravel those opportunities where the combined knowledge and techniques can mutually enhance each other, creating outcomes greater than the sum of their parts. Such integration holds the promise of innovative solutions, including nanoscale drug delivery systems, cutting-edge diagnostic tools, and pioneering methods to advance our understanding of and improve human health. The integration of nanotechnology with physiology holds great applications in precision medicine, biosensors, tissue, tissue engineering, and detection of diseases at their early stages. Besides this, portable nanoscale diagnostic devices are being developed for rapid, on-site testing of various diseases. These devices can be particularly valuable in resource-limited settings. Emerging Nanotechnological approaches now play a pivotal role in developing Brain-Computer Interfaces (BCIs), which allow direct communication between the brain and external devices. This has implications for neurorehabilitation and assisting individuals with neurological conditions. Finally, nanoparticles can target and deliver therapeutic agents to specific brain regions, potentially slowing the progression of diseases like Alzheimer's and Parkinson's. However, it is essential to navigate the associated challenges and ethical considerations to ensure the responsible development and application of these

innovations. Ultimately, this convergence holds the potential to improve the quality of healthcare and enhance our understanding of the physiological intricacies that govern life. We will explore these applications and discuss the associated challenges we can face with the integration of nanotechnology with physiology.

Keywords: Nanotechnology, Physiology, Biosensors, Nanoscale

Importance of Honey Bee and Basic Breeding Methods

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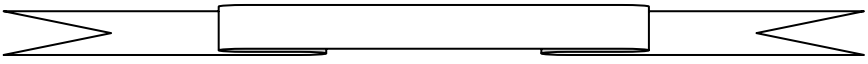
Abstract-Honey bees play a crucial role in our ecosystem and have significant importance for both the environment and human society. Honey bees are among the most effective pollinators in the natural world. They visit flowers to collect nectar and pollen for their hive, inadvertently transferring pollen from one flower to another. This process is vital for the reproduction of many flowering plants, including many of the fruits, vegetables, and nuts that make up a large part of our diet. Through their pollination efforts, honey bees help maintain and promote biodiversity by supporting a wide variety of plant species. This, in turn, sustains habitats for other wildlife While not as significant as their role in pollination, honey production is an important industry in many parts of the world. Honey has been used for millennia as a natural sweetener and for its medicinal properties. Beside the benefits of bees to our environment, its contribution to the economy as bee product is also important. In order to get high efficiency in beekeeping, the bees used for productivity must be improved by some characters. Honey bee breeding involves various techniques and methods to select and propagate desirable traits in honey bee colonies. These traits may include high honey production, resistance to diseases and pests,

docility, and other characteristics that are valuable to beekeepers. Natural Selection, Artificial Insemination, Selection of Breeding Stock,Queen Rearing, Closed Population Breeding, Open Mating, Hybrid Breeding, Genetic Marker-Assisted Selection, Breeding Programs nad Behavioral Selection methods are some common honey bee breeding methods used today. Remember that successful breeding programs often require careful record-keeping, knowledge of bee genetics, and a clear understanding of the traits you want to select for. Additionally, it's important to consider ethical and ecological implications of breeding practices, such as maintaining genetic diversity and avoiding the spread of diseases. In conclusion, bee breeding is crucial for sustaining ecosystems, ensuring food security, and supporting agricultural economies. By investing in bee breeding programs, we can help address many of the challenges facing our environment, food systems and economy.

Key words: Honey bee, breeding methods, selection, artificial insemination, honey bee disease



Genetics Research and its Translation to Clinical Trials in Pakistan

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Abstract- Pakistan is a population of 225 million people with high trends of family marriages. Genetic disorders are prevailing in this population and many genes and mutations have been identified so far in Pakistani families. Globally, scientists are trying to cure genetic disease through gene therapy approaches. Clinical trials of some of these drugs showed good results and many are approved from FDA, USA for treatment and management purposes. Most of these clinical trials and research on animals prior to human trials is carried out in technologically advanced countries. Unfortunately,

despite having so many affected people, no clinical trials in genetic disease is ever carried out in Pakistan. In this talk, we review the current procedures of gene identification and update on clinical trials on genetic diseases. Also, we discuss the issue related to clinical trial research in Pakistan and we put some suggestions for betterment.

Keywords: Genetics Research, Clinical Trials, Pakistan

Deciphering the *Cis*-regulatory Catalogue of Zebrafish Endodermal Genes

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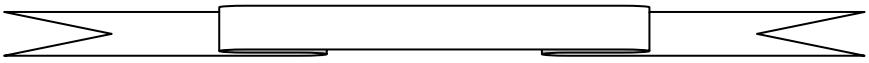
Abstract- Regulation of gene expression in the early endoderm, the germ layer that will form the gastrointestinal tract, respiratory tract, and associated organs, involves combinatorial transcriptional and signalling inputs into the cis-regulatory modules (CRMs) of a conserved network of genes, including mixl1. In zebrafish, Mixl1, a homeodomain transcription factor, regulates endoderm specification in response to Nodal signalling and is itself a mediator of Nodal signalling. mixl1 is expressed transiently in the embryo at the margin of the blastula and early gastrula. However, how this expression is regulated at the cis-regulatory level is unknown. As an initial attempt to elucidate CRMs of mixl1, we identified a 627 bp genomic interval upstream of the mixl1 transcription start site using unbiased Circularized Chromosome Conformation Capture followed by Sequencing (4C-Seq) and Chromatin Immunoprecipitation Sequencing (Chip-Seq) data. This region drives reporter expression in the margin and correlates with endogenous mixl1 expression in early zebrafish embryos. Moreover, the deletion of the identified enhancer by CRISPR/Cas9

caused a reduction of mixl1 expression in the margin, suggesting this CRM is sufficient and necessary for early mixl1 expression. Elucidation of such mixl1-associated CRMs will offer insight into the transcriptional and signalling inputs that drive endodermal transcriptional regulation.
Keywords: *Cis*-regulatory, Catalogue, Zebrafish, Endodermal Genes



ABSTRACTS
ORAL
PRESENTATIONS

BOTANY

Exploring Allelopathic Potential of *Pseudomonas* against Cotton Weed (*Sorghum Halepense*)

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Abstract- Cotton (*Gossypium hirsutum* L.) belongs to the Malvaceae (mellow) family of plants. It is one among Pakistan's main crops. Use of Pakistan is the third-largest buyer of raw cotton in the world and the fourth-largest producer of cotton worldwide. Moorland cotton, or *G. hirsutum*, is a commercially significant crop for the manufacture of textiles and provides 35% of all thread used globally. One of the principal weeds with significant allelo-pathic power is Sorghum halepens, sometimes known as Johnson-grass, is one of the most pervasive and upsetting weeds. From low to high concentrations, allelochemicals in *S. halepense* leaf extract affect and inhibit cotton seed development rate, fresh and dry biomass and seedling length. Use of Biological method in order to lessen the *S. halepense* allelopathic stress and to promote the growth of cotton seeds, Pseudomonas PF 083 acts as both a herbicide and as a PGPR. Cotton seed germination, seedling length, fresh seedling biomass, and dried seedling biomass all were significantly increased with the addition of Pseudomonas PGPR PF083. This study finds out that the shoot length, fresh and dry biomass of *S. halepense* was also increased by the use of natural PGPR.

Keywords: Gossypium hirsutum, Biological Control, Pseudomonas PF 083, Allelopathy, Sorghum halepense

Production, Optimization and Characterization of *Serratia ne matodiphila* MB307 to Synthesize Polyhydroxybutyrate Using Wastewater in Submerged Fermentation

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Abstract- Polyhydroxybutyrates (PHBs) are microbial polyesters having features resembling petroleum-based plastics thus termed as green plastics. Different species of bacteria evolving from diverse environments have shown the ability to produce these plastics with sustainable and environment friendly properties. In the current study potential of PHB accumulation was demonstrated by a biodegrading strain of *Serratia nematodiphila* MB307 for the first time by using simulated wastewater as a substrate for submerged fermentation. Strain MB307 was isolated from polluted acidic soil of Hattar Industrial Estate, Haripur Pakistan. This is the first study showing 4.53 g/L PHB production using simulated wastewater and 4.8 g/L in the presence of glucose. Experimentally obtained optimum values of PHB production were further statistically endorsed by Response Surface Methodology which predicted PHB production as 4.31g/L which is near to experimentally obtained data. Biopolymer characterization by FTIR revealed distinctive bands of PHB at 1726 cm^{-1} and 1732 cm^{-1}. GCMS chromatograms of polymer obtained from *Serratia* showed major peak of methyl ester of pentadecanoic acid at retention time of 24 minutes. HPLC analysis of the biopolymer depicted the retention time of PHB at 2.6 minutes. Thermogravimetric analysis showed that 80% of the polymer mass was lost at 346°C, which depicts the thermostable nature of the polymer. Thus, this study highlighted the biodegradable polymer production from strain *Serratia nematodiphila* MB307. Strain MB307 has also depicted heavy metal tolerance and this feature was employed in this study as reported strain showed growth and metabolic potential in heavy metal composition of simulated wastewater. This study is important as it encompasses ‘trash to treasure’ phenomenon where wastewater was used and converted into valuable bioproduct PHB using microbial biosynthesis path.

Keywords: Polyhydroxybutyrate, Serratia nematodiphila MB307, biopolymer, simulated wastewater, Response Surface Methodology

Biological Control of Chili Damping-off Disease, Caused by *Pythium myriotylum*

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Abstract- *Pythium myriotylum* is a notorious soil-borne oomycete that causes post-emergence damping-off in chili pepper. Of various disease management strategies, utilization of plant growth promoting rhizobacteria (PGPR) in disease suppression and plant growth promotion is an interesting strategy. The present study was performed to isolate and characterize PGPR indigenous to the chili rhizosphere in Pakistan, and to test the potential to suppress the damping-off and plant growth promotion in chili. Out of a total of 28 antagonists, eight bacterial isolates (4a2, JHL-8, JHL-12, 1C2, RH-24, 1D, 5C, and RH-87) significantly suppressed the colony growth of P. myriotylum in a dual culture experiment. All the tested bacterial isolates were characterized for biochemical attributes, and 16S rRNA sequence based phylogenetic analysis identified these isolates as Flavobacterium spp., Bacillus megaterium, Pseudomonas putida, Bacillus cereus, and Pseudomonas libanensis. All the tested bacterial isolates showed positive test results for ammonia production, starch hydrolase (except 4a2), and hydrogen cyanide production (except 4a2 and 1D). All the tested antagonists produced indole-3-acetic acid (13.4–39.0 mg mL-1), solubilized inorganic phosphate (75–103 mg mL-1), and produced siderophores (17.1–23.7%) in vitro. All the tested bacterial isolates showed varying levels of susceptibility and resistance response against different antibiotics and all these bacterial isolates were found to be non-

pathogenic to chili seeds and notably enhanced percentage seed germination, plumule, redical length, and vigor index over un-inoculated control. Additionally, under pathogen pressure, bacterization increased the defense related enzymes such as Peroxidase (PO), polyphenol oxidase (PPO), and phenylalanine ammonialyase (PAL) activates. Moreover, the treatment of chili seeds with these bacterial isolates significantly suppressed the damping-off caused by P. myriotylum and improved PGP traits compared to the control. In addition, a positive correlation was noticed between shoot, root length, and dry shoot and root weight, and there was a negative correlation between dry shoot, root weight, and seedling percentage mortality. These results showed that native PGPR possesses multiple traits beneficial to the chili plants and can be used to develop eco-friendly and effective seed treatment formulation as an alternative to synthetic chemical fungicides.

Keywords: Antagonism, Bacillus spp., PGPR, Pseudomonas spp., *Pythium myriotylum*, IAA production, Siderophore production

Application of Potential Bio-agents and Vermicompost in the Management of Tomato Early Blight Disease

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Abstract-Tomato (*Solanum lycopersicum* L.) is one of the most significant vegetable crops worldwide. It serves as a rich source of various vitamins, minerals, sugars, and antioxidants. Tomato yield is greatly reduced due to various viral, bacterial, and fungal pathogens. Among all, early blight is one of the most dreadful diseases caused by *A. solani* resulting in 79% yield loss if left untreated. Different strategies like cultural control, biological

control, and chemical control are employed to manage early blight. Application of synthetic pesticides is an expensive and not eco-friendly approach while utilization of bioagents is eco-friendly as well as cost effective. The purpose of the current study was to examine the bio-efficacy of antagonistic bacterial isolates and vermicompost against tomato early blight. The degree of disease severity and protection, morphological indicators, and yield attributes were also observed. In vitro antagonistic activity of PGPR against *A. solani* was tested. Bacterial treatment in combination with vermicompost significantly reduced the disease severity and increased protection by 93.0%. Bacterial treatments along with vermicompost significantly induced the production of TPC (3 to 20 mg/g of fw), PO (0.5 to 2 Katal/mg of total proteins), PPO (0.5 to 3 Katal/mg of total proteins), PAL (0.25 to 3 Katal/mg of total proteins) and CAT (20 to 80 Katal/mg of total proteins) which ensure the induction of systemic resistance in plants against early blight. Co-inoculation of PGPR along with vermicompost significantly increased the plant growth parameters and suppressed early blight disease in tomato plants. Based on excellent features of PGPR and vermicompost as inducers of plant growth and antifungal activities, our study may offer insights for addressing key agricultural challenges, particularly in the treatment of *A. solani* invasion across tomato plants.

Keywords: Tomato, Early Blight, *Alternaria solani*, PGPR, Vermicompost, Disease management, Nutrient Uptake, Plant growth promotion.

Impact of *Trichoderma Harzianum* Broth and Leaves Powder of *Cassia Fistula* and *Azadirachta Indica* on Early Blight of Tomato

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Abstract- In the present study, tomato seedlings were grown under the stress of early blight disease caused by a deadly pathogen *Alternaria solani*. To control this disease, Antagonistic fungi *Trichoderma harzianum* and leaf powder of two different plants were used. Two medicinal plants *Cassia fistula* (Amaltas) and *Azadirachta indica* (Neem) leaves powder were used to mitigate the fatal effect of *A. solani*. Various growth parameters like shoot, root length, and fresh and dry weight were studied. Moreover, the biochemical and physiological attributes of tomato plants were investigated. The results revealed that the growth parameters of tomato seedlings were significantly declined by 40% when infested by late blight disease. However, soil amendments with *Trichoderma harzianum + cassia fistula* nullify the effect of the pathogen and increase plant growth. Furthermore, the biochemical and physiological traits exhibit more production and less activity, respectively in plants when plants were grown *in T. harzianum + C. fistula*. The trend of better growth in plants was *T. Harzianum + C. fistula> T. harzianum > C. fistula>*. Therefore, the soil amendment with *T. Harzianum + C. fistula* in pathogen-infested soil could be implemented to combat the late blight of disease. The result indicated that the presence of *Trichoderma harizanum* renders the growth of *A. solani*, it might be the presence of melatonin production under the stress condition, resulting in better growth and yield in tomato.

Keywords: Late Blight disease, Tomato, Trichoderma, Cassia, Neem leaves, Melatonin

Bioremediation of Crude Oil Contaminated Soil with Plant Microbiome System

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Abstract- Bacterial assisted phytoremediation is recently being considered to be an efficient technique for remediation of crude oil-contaminated soil. The present research was designed to establish a plant microbiome bioremediation system for treating crude oil contamination. 10 strains of plant growth-promoting rhizobacteria (PGPR) were isolated from oil-contaminated soil near Oil Refinery Rawalpindi, Pakistan. Based on plant growth-promoting characteristics and biosurfactant production, two strains (*Pseudoarthrobacter phenanthrenivorans* (MS2) and *Azospirillum oryzae* (MS6)) were selected. They showed a better emulsification index (54.2, 42.5%), oil displacement activity (3.4, 2.6 mm) and hydrophobicity content (78, 75%,). For the establishment of the plant microbiome system, both strains and their combination were inoculated in rhizospheric soil of maize in crude oil-contaminated soil. Better germination attributes of maize were observed by a combination of both strains with improved fresh (32 %) and dry biomass (26.5 %) as compared to control under oil stress (10 %). Plant microbiome bioremediation system improved the chlorophyll content (30.4 %), water potential (23.2 %), proline (32 %), amino acids (11.1 %), and antioxidant enzymes (catalase (21 %), peroxidase dismutase (30 %) and superoxide dismutase (22 %), as compared to control under oil stress (10 %). The hydrocarbons degradation efficiency of this system was 38.5%. Analysis of degradation products by GC-MS revealed the presence of low molecular weight hydrocarbons in the treated soil as compared to untreated soil. This study showed promising results by this plant microbiome system can be a way forward in bacterial assisted phytoremediation approaches at the field level in the future.

Keywords: Antioxidant enzymes, Biosurfactant, consortium, Hydrocarbons, oil degradation

Utilization of agro-waste and PGPR for Eco-Friendly Bio-fertilizer production for sustainable agriculture

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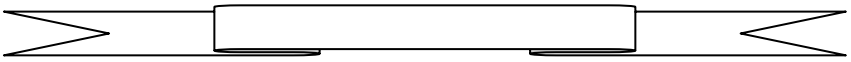
Abstract- Excessive use of chemical fertilizers is not only harming the soil fertility but also has bad effect on human health. This study investigates the use of rice bran as a sustainable resource for the production of eco-friendly fertilizers using plant growth promoting rhizobacteria. Rice bran is common agriculture waste product with high organic content that can be a good source of nutrients for microbes. This study determines the utilization of agro-waste for preparation of biofertilizer. Five strains were isolated from wheat rhizosphere. On the basis of PGPR characteristics one was selected for 16s RNA sequencing. Rice bran were dried, grind and autoclaved. Rice bran has 10-15% crude protein. Inoculum of *Paenibacillus sp.* was prepared and it was added in processed rice bran. This was allowed to ferment in a closed container. After seven to ten days samples were drawn. Germination and glasshouse experiments were conducted to evaluate the effect of bioorganic fertilizers on wheat. Results indicated that application of biofertilizers showed best result as compared to uninoculated pots. Seeds treated with bio-organic fertilizers depicted maximum germination percentage (90%) as compared to control (70%). Results of the pot experiment showed similar positive effects; chlorophyll content increased 28%, relative water content 39.28%, protein 3% and amino acid 20.73% was observed. Based on this result, it was concluded that there is a positive effect of BIOs on germination and growth parameters of maize and this bioorganic

fertilizer can be recommended to farmers for the production of wheat.

Keywords: Chemical Fertilizer, Soil Fertility, Rice Bran, Agro-Waste, Plant Growth Promoting Rhizobacteria



Environmental Monitoring of Self-Sustaining Artificial Micro Ecosystem

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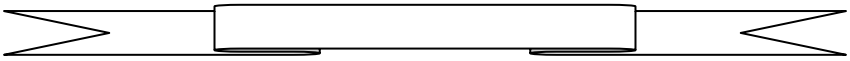
Abstract- A self-sustaining ecosystem is an ecological milieu that possesses the natural capacity to perpetuate its structural integrity, functionality, and ecological processes without an external influx of resources or interventions. The ultimate stability of the ecosystem is dependent upon nutrient cycling and disturbance within the ecosystem's resilience. Nutrient cycling: within this intricately designed microcosm, a precisely balanced nutrient cycle sustains life. Nutrients are expertly managed through microbial decomposition and plant uptake, maintain this self-sustaining artificial ecosystem. Continuous monitoring ensures the integrity of this vital cycle, fostering long-term ecological equilibrium. The current study was aimed at the establishment of self-sustaining micro ecosystem. The closed 6-inch micro ecosystem was established with the particulars as, 1-inch drainage layer, of gravel, 0.5-inch charcoal layer, lush 1-inch moss layer, 1-inch soil layer and the topmost layer featuring carefully selected plants and small animals, creating a self-contained, miniature ecosystem within the beaker was established. A temperature drop within the terrarium container was observed as compared to the external temperature. The overall observation includes the behavior of added organisms within distinctively temperature. Significant change in humidity content was observed in the given ecosystem as compared to the

external environment. The micro ecosystems can be utilized as bio living labs to monitor ecological stresses and challenges with increasing temperature.

Keywords: Closed Ecosystem, Microclimate, Nutrient fluxes, Terrarium. Botanical display



In-silico analysis of Serpin gene family in *Setaria italica* [L.] at Genome Level

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Abstract- Serpins (serine protease inhibitors) constitute one of the largest and most widely distributed superfamilies of protease inhibitors and have been identified in nearly all organisms. In plants they have a role in defense against biotic and abiotic stresses. In this study, a comprehensive *In-silico* analysis of the serpin gene family was performed in *Setaria italica* using bioinformatic tools at the genome level. The current study identify 17 SiSRP genes randomly distributed throughout the Setaria genome. Chromosomal maps were developed to find the exact location of different genes on their respective locus at chromosomes. Gene structure, conserved motifs and phylogenetic analysis support the duplication events in evolutionary history. Segmental duplication was shown to be a main driving force for the expansion of SiSRP genes through natural selection. The different expression patterns of different genes in different tissues highlighted their specific roles at different developmental stages. The results of evolutionary rate calculation revealed some genes diverged earlier than the Poaceae, and some after Poaceae, while few genes diverged recently. Further, a single LR (SiSRP9-1) was identified and is expected to have a protective

role against insects and pathogens in plants. Consequently, this research provides significant insight into the serpin gene family of *Setaria italica*, and provide basis for the further experimental validation of identified genes through different options such as overexpression, knockout via CRISPR/Cas9 systems, etc.

Keywords: Serpins, Phylogenetic analysis, Segmental duplication, Conserved motifs, Pathogens

Unveiling Biological Potential and Phytochemical Screening of *Lactuca orientalis* (Boiss.) Boiss.

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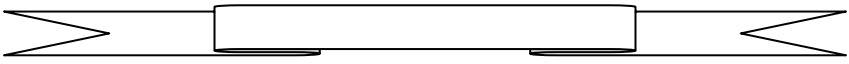
Abstract- Phytochemical screening is a footprint for the discovery of bioactive components present in medicinal plants. The current study was aimed to unveil phytochemical composition, pharmacological evaluation of medicinal plant *Lactuca orientalis* (Boiss.) Boiss. The following assays were performed: α-amylase inhibition assay to evaluate antidiabetic properties, a brine shrimp assay using MTT assay to assess cytotoxicity and anti-leishmanial activity, and a disc-diffusion assay to detect protein kinase inhibitory, antibacterial, and antifungal activities. The methanol extract of *L. orientalis* (LOM) was found to contain a substantial amount of phenolic (93.76 ± 3.71 GAE/mg) and flavonoid (77 ± 3.60 QE/mg) content. LOM exhibited the highest DPPH scavenging potential (83%). Notably, LOM displayed significant total antioxidant capacity (91.60 ± 1.55 AAE/mg) and total reducing power (93.44 ± 1.38 AAE/mg). Moreover, LOM demonstrated the highest α-amylase inhibition activity (76.20 ± 1.58%). On the other hand, the n-Hexane extract (LOH) exhibited the highest LD50 value

in the brine shrimp assay at 13.03 µg/ml. All extracts, except LOH, showed strong anti-leishmanial activity. Furthermore, L. orientalis seeds exhibited notable protein kinase inhibition, antibacterial, and antifungal activities. In summary, this study scientifically supports the ethnomedicinal and biological potential of *L. orientalis*. Future research should focus on the identification and isolation of bioactive compounds from different part of *L. orientalis*. Additionally, further in vivo studies are warranted to evaluate their pharmacological properties.

Keywords: Lactuca orientalis (Boiss.) Boiss, Antimicrobial, enzyme inhibition assays, antioxidant, anti-leishmanial



Ecological Risk Assessment Of Heavy Metals In Fresh Water Stream Nala Palkhu, Sialkot, Using Sediments And Aquatic Plants

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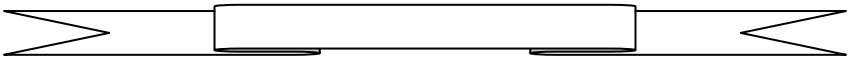
Abstract- Natural deposits and maladministration coupled with rising population has been accountable for inadmissible modification of aquatic as well as terrestrial territory. Nala Palkhu, a freshwater stream located in Sialkot, has been subjected to industrial and anthropogenic activities, potentially leading to the accumulation of heavy metals in sediments and aquatic plants. In the present research, we have been assessed the ecological risks of heavy metals in fresh water stream-Nala Palkhu, Sialkot using sediments and aquatic plants. This study aims to assess the ecological risks associated with heavy metal (Zn, Cd, Cr, Ni, Pb) contamination in Nala Palkhu, focusing on sediments and aquatic plants as indicators. For this purpose, sediment, water and aquatic plants samples were collected. The conservation and threat status were assessed for normal distribution. The two plant species were

studied for this purpose i.e., Ranunculus sceleratus and Persicaria maculosa. The physical, biological, chemical and growth of the plants in the moist habitat, soil type, and soil pH for both species were also are observed. Results suggested that Nala Palkhu is experiencing varying degrees of heavy metal contamination in both sediments and aquatic plants. The concentrations of certain heavy metals exceeded the permissible limits set by regulatory authorities. The study provides valuable insights into the ecological risks posed by heavy metals in the Nala Palkhu freshwater stream in Sialkot. The ecological risk assessment indicated moderate to high ecological risks associated with heavy metal contamination in the stream. Consequently, the data from this research could be considered for the conservation plan, management and re-conservation method for these species.

Keywords: Heavy metal, Aquatic plants as bioaccumulator, Ecotoxicology, Biotic indices, Water pollution



Baseline studies and Conservation Status of the Plant Bio-Diversity of Kurram District KPK

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Abstract- The present study was undertaken in the year 2021 for the estimation of the plant biodiversity of Kurram Valley, including the baseline studies of the different targeted areas of the Kurram valley. The Kurram valley has an area of 3000 sq. km. Kurram has 03 crossing points/entries with Afghanistan i.e., Kharlachi and Ghawi are the important once. The area is distributed in the sub-tropical deciduous to scrub forest to sub-alpine and alpine pastures.

Kurram District took its name from Kurram River that passes through it entirely. The Headquarter of Kurram is Parachinar. The district has its borders with Afghanistan on the north and west with

the provinces Nangarhar and Puktia respectively. On the east it is bounded by Orakzai and Khyber Districts, on the southeast by Hangu and south by North Waziristan. The Koh-Safeed (White Mountains) called (Spīn Ghar) in "Pushto language" is the main mountain range in the district. Its highest peak is Mount Sikaram on the Afghanistan–Pakistan border, which towers above all surrounding hills to 4,755 m (15,600 ft.) above mean sea level.

The studies were conducted in the three sub-divisions of Kurram valley i.e., central, upper and lower Kurram sub-divisions. Kurram overall has a fair representation of trees, shrubs and herbs in the area. There were total 128 plant species representing the 61 plant families reported from the Kurram area in the targeted studies. The Kurram valley is situated in the sub-tropical to dry deciduous scrub evergreen forest. The valley also has the highest sub-alpine to alpine pastures e.g., Koh-Safeed mountain range. The vegetation consists of scrub vegetation species including *Quercus, Monotheca, Olea, Nannorrhops, Dodonea, Robinia, Ailanthus* etc. The Lower Kurram area has the Mali Khel area having the Mali Khel Dam near Afghan border. The other river Kurram enters into Pakistan from Afghanistan via Paktia. The vegetation in the lower Kurram consisted of *Monotheca, Olea, Acacia modesta, Melia, Dodonea, and Calotropis* etc. There is a fair representation of *Nannorrhops ritchiana* in the area. The other allied species consists of *Withania coagulans, Solanum surrattense, Xanthium, Daphnae, Conyza, Platanus* etc. The vegetation in the upper Kurram has the 6 important plant species including *Pinus wallichiana, Abies pindrow, Pinus wallichiana, Quercus, Juglans regia* etc. The Central Kurram comprised of Dogar, Sadda area, Murghan top, Yaqeen Qila. The plant species included *Robinia, Nannorohps ritchiana, Monotheca, Punica sp, Prosopis juliflora, Eleagnus, Diospyrus sp, Ailanthus sp, Berberis sp,* and the un-wanted invasive weed *Parthenium hysterophorus* etc. There are many plant species utilized by the local people as food, fruit, vegetable or medicine. Mostly older people are more frequently using the plant species as medicine. Therefore, the local people in the area have a very strong connection with the plants

for their daily use utilization as food and medicine. There is need of conservation of the plant biodiversity that is under serious threat of extinction due to the illegal cutting and overexploitations of the plant resources.

Keywords: Biodiversity, Kurram valley, Conservation, Baseline Studies, Flora

Modulation of Barley (*Hordeum Vulgare* L.) Defense and Hormonal Pathways by *Pseudomonas* Species Accounted for Salinity Tolerance

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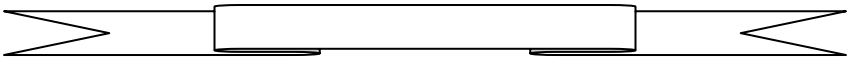
Abstract- Salinity stress is a major challenge affecting the crop yield worldwide. In the present study, we investigated two *Pseudomonas* species strains (*Pseudomonas fluorescens* SBW25 and *Pseudomonas putida* KT2440) for their use in plant tolerance under salt stressed conditions. Barley (*Hordeum vulgare* L.) plants inoculated with PGPR strains were subjected to 200mM salinity stress and were analyzed in comparison to non-treated stressed plants based on height, leaf area and fresh and dry weights of shoots. Our data revealed significant enhancement of root fresh and dry weights, chlorophyll content and relative water content in PGPR applied plants. Further investigation of various phytohormones (ABA, JA, ethylene, SA and IAA), stress responsive transporters and antioxidant enzymes genes at molecular level revealed that among the selected genes of ABA biosynthesis and regulated genes i.e., *NCED, DHN5, DRF1* and *WRKY18* were significantly down-regulated, while *P5CS1* and *DHN1* genes were significantly up-regulated by PGPR applications. Except *LOX2* all the selected genes (*FAD3, LOX1, AOS, AOC, OPR3, PLDα1* and *PI (SD10))* of JA biosynthesis

pathway were significantly up regulated by *P. putida* KT2440 strain. KT2440 strain also significantly induced the expression of ethylene biosynthesis *ACCO* and *ACCS* genes and SA biosynthesis *ICS* and protein kinase *MAPKK* genes. Both PGPR strains, displayed significant downregulation of *NHX1* antiporter, while a significantly enhanced expression of nitrate transporter *NRT2.2*, and antioxidant *CAT2* genes was observed in *P. fluorescens* SBW25 inoculated barley roots compared to control roots. The findings of our study revealed the effectiveness of these PGPR strains for stress tolerance and elevated growth of barley plants under salt stress.

Keywords: Salt stress, Hordeum vulgare L., PGPR, ABA, Ethylene



Multi-stress tolerance of PGPR *Bacillus siamensis* PM 15 to suppress sugarcane fungal diseases

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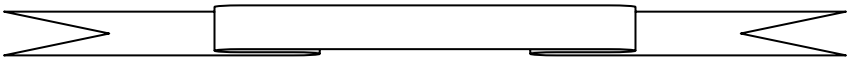
Abstract- Sustainability in crop production has emerged as one of the most important concerns of present era's agricultural systems. Plant growth promoting bacteria (PGPB) has been characterized as a set of microorganisms used for enhancing plant growth and a tool for biological control of phytopathogens. However, the inconsistent performance of these bacteria from laboratory/greenhouse to field level has emerged due to prevailing abiotic stresses in fields. Sugarcane crops encounter a combination of biotic and abiotic stresses during its long developmental stages. Nevertheless, the selection of antagonistic PGPB with abiotic stress tolerance would

be beneficial for end-user by the successful establishment of product with required effects under field conditions. Stress tolerant *Bacillus siamensis* strain isolated from the sugarcane rhizosphere grown in the fields was examined for various PGP activities, enzyme assays, and antibiotic resistance. Strain was screened for in vitro tolerance against drought, salinity, heat stress, and heavy metal toxicity. Inhibition co-efficient of B. siamensis was also calculated against six phyto-pathogenic fungi, including *Colletotrichum falcatum, Fusarium oxysporum , Fusarium moniliforme , Rhizoctonia solani , Macrophomina phaseolina , and Pythium splendens* . Role of 1-aminocyclopropane-1-carboxylate deaminase in the amelioration of biotic and abiotic stress was also supported by the amplification of acds gene. Moreover, in vitro and in vivo experiments revealed *B. siamensis* as the potential antagonistic PGPR and bio-control agent. Results of greenhouse experiment against sugarcane red rot indicated that inoculation of *B. siamensis* to sugarcane plants could suppress the disease symptoms and enhance plant growth. Augmented production of antioxidative enzymes and proline content may lead to the induced systemic resistance against red rot disease of sugarcane. Thus, the future application of native multi-stress tolerant bacteria as bio-control agents in combination with current heat, drought, salinity, and heavy metal tolerance strategy could contribute towards global food security.

Keywords: Antibiotic resistance, Bacillus siamensis, Biocontrol, Inhibition co-efficient, Phytopathogens, Red rot



Mitigating Pb uptake in *Capsicum annuum* L. Var Shooter Using Rice Husk Based Biochar

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Abstract- Environmental pollution of heavy metals has become a major concern throughout the world. Industrialization has grown at a fast rate in the last century. The presence of metallic compounds as a contaminant changes the quality of soil and risks to the health of human as well as animals when enter in food chain. To overcome this problem, application of bio-char reduces the bioavailability of heavy metals in plants, improve the soil texture and yield. In this study rice husk was used to synthesize biochar. This bio-char was applied in lead (Pb) contaminated soil at the rate of 0.25%, 0.5% and 0.75% and Pepper (C*apsicum annuum* L. Var. shooter) were grown in pots. After 45 days, the plants were harvested and analyzed for different parameters. The presence of biochar increases the plant height, shoot length, root length, fresh weight. This study also indicates that bio-char helped to increase the growth parameters of plant and retain content of moisture in soil. The biochar significantly decreases the amounts of lead (Pb) uptake by C*apsicum annuum.* It also reduced the availability of lead (Pb) in soil, and parts of plants. It was concluded that bio-char is a very useful tool for lead remediation and this can reduce the mobility of lead (Pb), so that the contaminated agricultural soils can be used for crop production. Therefore, it is concluded that biochar amendment is an eco-friendly approach and can reduce the human health risk by heavy metals.
Keywords: Biochar, immobilization, soil amendments, *Capsicum annuum*, eco-friendly

Synergistic effect of Phyto-mediated nanoparticles on photocatalytic degradation of azo dyes

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Abstract - The current research project focuses on the inquisition of the degradation potential of phyto-mediated biogenic copper oxide and iron oxide nanoparticles (produced from *Trichodesma indicum*) against selected azo dyes (methyl orange and reactive black 5). The individual, as well as synergistic effects of these two nanoparticle emulsions, were investigated. For methyl orange (50 µg/mL), there was insignificant degradation (along with unobservable color change) in each of the experiments utilizing a single nanoparticle emulsion (500 µg/mL). However, the synergistic mixture of 1:1 ratio (500 µg/mL) between copper oxide and iron oxide nanoparticles was able to show a maximum degradation of 28.5% under UV radiation treatment after 6 hours. In the case of reactive black 5 (50 µg/mL), there was minor degradation in all the individual nanoparticle treatments except for iron oxide nanoparticles (500 µg/mL) under UV light. This experiment demonstrated a 25.3% degradation efficiency after 6 hours of treatment. However, the values for reactive black 5 and individual nanoparticle emulsions were greater than those obtained for methyl orange. Moreover, for the synergistic effects, there was slight degradation observed in the case of reactive black 5. Samples showing the maximum degradation from the experiment with methyl orange investigating the synergistic effects were evaluated in terms of its degradation products using Gas Chromatography-Mass Spectrometry (GC-MS). Results demonstrated a high number of fatty acids (esters) which depicted high quantities of alkenes, alkyl benzenes, and phenol-based compounds.

Keywords: Trichodesma indicum, Iron oxide nanoparticle, Copper oxide nanoparticles, Dye degradation, Methyl orange, GC-MS

Efficiency of Multiple Extraction Solvents on Antioxidant, Antibacterial and Phytotoxicity of *Allium jacquemontii*

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Abstract- *Allium jacquemontii* possess various medicinal characteristics along with biological activities, and is used as a traditional medicinal. The undergoing research is carried out to check the efficiency of various extractions solvents on antioxidant, antibacterial and phytotoxic activity of *A. jacquemontii*. The arial and bulb of the plant were used and methanolic, chloroform and distilled water extracts were tested for different activities by the use of standard methods. The antioxidant assay was performed by DPPH activity, total reducing power (TRP) and total antioxidant capacity (TAC). Toxicity examination was performed by using the radish seed phytotoxic assay. Antibacterial assay was done by "Disc method". *A. jacquemontii* methanolic extract showed the highest phenolic and saponin contents in arial and bulb. Moreover, the extract of the methanol solvent also shown the maximum DPPH potential in arial (84.81 ± 0.93 µg/mL) and bulb (79.45 ± 0.17 µg/mL) part, reducing potential (49.29 ± 1.11µg/mL), and TAC (38.91 ± 1.12 µg/mL) as compared with chloroform and distilled water. Furthermore, methanolic *A. jacquemontii* extract of arial and bulb also exhibited the highest antibacterial activity to some strains when compared with chloroform and distilled water extract. Similarly, methanolic extract showed significant cytotoxic value while methanolic as well as chloroform extracts were found adequate phytotoxic mediators as compared with standard in *A. jacquemontii*. Bulb methanolic extract of *A. jacquemontii* also showed anti-cancer activity results depicted that percentage inhibition is less than 50 % in plant extract. Hence, present study demonstrated that methanolic extract of arial and bulb of *A. jacquemontii* possesses prominent phytochemicals which are

potentially involved in antioxidant actions and have antibacterial and cytotoxic potentials.
Keywords: *Allium jacquemontii;* Leaf, Bulb extracts, antioxidant actions and have antibacterial and cytotoxic potentials

Fabrication of Rhamnus triquetra Wall. Based Ag_2ONPs and their Diverse *Invitro* Biological Applications

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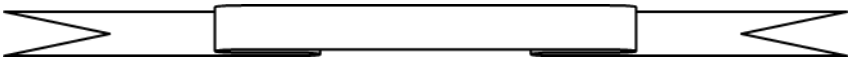
Abstract- An ecofriendly approach for the preparation of green silver oxide nanoparticles (Ag_2ONPs) by reducing $AgNO_3$ salt with the aqueous extract of *Rhamnus triquetra* (RT) is described. The purity, shape and size of RT- Ag_2ONPs were extensively studied via SPR spectra obtained from UV-visible spectroscopy, X-rays diffraction spectral studies (XRD), Fourier transform-infrared spectroscopy (FT-IR), SEM (scanning electron microscopy), energy dispersive X-ray spectroscopy (EDX) and DLS. Different bio applications including anti-leishmanial activity, anti-microbial activity, anti-cancer activity, bio-compatibility and anti-oxidant properties were investigated. In current study, Ag_2ONPs have shown potential anticancer activity (IC_{50}: 13.38µg/mL). Further, excellent anti-leishmanial activity (with $IC_{50promastigotes}$: 11.13 µg/mL, $IC_{50amastigotes}$: 26.12 µg/mL) was also reported. The RT-Ag_2ONPs have shown significant antioxidant activities (DPPH: 86%, TRP: 82% and TAC: 90%). Also, the *Rhamnus triquetra*-Ag_2ONPs were found to be bio-compatible in nature. Moreover, the

greenly synthesized Ag_2ONPs was observed to have good antimicrobial potential. The future research work can focus on different *in vivo* studies of RT- Ag_2ONPs and diverse bio-activities for attaining modern biogenic medicine desideratum.

Keywords: Nanoparticles, anti-leishmanial, anti-microbial, anti-oxidant, Biocompatable



Impact of *Trichoderma Harzianum* Broth and Leaves Powder of *Cassia Fistula* and *Azadirachta Indica* on Early Blight of Tomato

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Abstract- In the present study, tomato seedlings were grown under the stress of early blight disease caused by a deadly pathogen *Alternaria solani*. To control this disease, Antagonistic fungi *Trichoderma harzianum* and leaf powder of two different plants were used. Two medicinal plants *Cassia fistula* (Amaltas) and *Azadirachta indica* (Neem) leaves powder were used to mitigate the fatal effect of *A. solani*. Various growth parameters like shoot, root length, and fresh and dry weight were studied. Moreover, the biochemical and physiological attributes of tomato plants were investigated. The results revealed that the growth parameters of tomato seedlings were significantly declined by 40% when infested by late blight disease. However, soil amendments with *Trichoderma harzianum + cassia fistula* nullify the effect of the pathogen and increase plant growth. Furthermore, the biochemical and physiological traits exhibit more production and less activity, respectively in plants when plants were grown *in T. harzianum + C. fistula*. The trend of better growth in plants was *T. Harzianum + C. fistula> T. harzianum > C. fistula>*. Therefore, the soil amendment

with *T. Harzianum + C. fistula* in pathogen-infested soil could be implemented to combat the late blight of disease. The result indicated that the presence of *Trichoderma harizanum* renders the growth of *A. solani*, it might be the presence of melatonin production under the stress condition, resulting in better growth and yield in tomato.

Keywords: Late Blight disease, Tomato, Trichoderma, Cassia, Neem leaves, Melatonin

Synthesis and Characterization of Biodiesel via *Trifolium resupinatum* L. Seeds Oil Using Green Heterogeneous Nanocatalyst

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Abstract- In the current scenario of energy challenges and the rapid depletion of non-renewable resources, the development of renewable fuels is imperative. Biodiesel has emerged as an environmentally friendly substitute for fossil fuels due to its sustainable, renewable, and non-polluting characteristics. This study focuses on exploring the potential of novel non-edible seeds from Trifolium resupinatum L. for the production of high-quality biodiesel using a green nanocomposite of manganese and copper-doped iron oxide, that was synthesized using the aqueous leaf extract of Dracocephalum nuristanicum through a biological approach. The Trifolium seeds exhibited a high oil content of 35.5% with a low free fatty acid (FFA) content of 0.189 mg KOH/g, indicating the feasibility of a single-step transesterification process to convert Trifolium seed oil into fatty acid methyl esters (FAMEs). The optimized conditions for maximum biodiesel yield (89%) were

achieved through dynamic conditions of 1:6 oil to methanol ratio, 0.5 wt% catalyst loading, at 60 °C for 180 minutes. Response Surface Methodology (RSM) based on Box-Behnken design (BBD) was employed for biodiesel optimization. The as-synthesized nanocomposite was characterized using XRD, SEM, EDX, and FTIR techniques, while the produced biodiesel was characterized through FT-IR, GC-MS, and 1H and 13C NMR analyses. The fuel properties of the synthesized biodiesel complied with the specifications of various biodiesel standards, including ASTM-951, 6751, China GB/T 20828, and the European Union (EU-14214). This study demonstrates that biodiesel synthesis from the non-edible seed oil of T. resupinatum L. using the green nanocomposite (Mn-Cu doped Fe) can contribute to the generation of renewable energy and economically viable biodiesel production. It further suggests the identification and large-scale cultivation of non-edible feedstocks for industrial biodiesel production.

Keywords: Biodiesel production; Non-edible seeds; Green nanocomposite; Renewable energy; Transesterification

Title: Role of Biochar in Plant Physiology, Growth and Antioxidant Defense under Drought Stress

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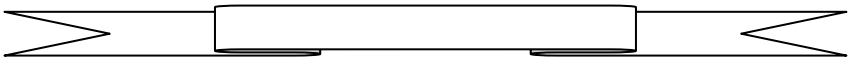
Abstract- Drought stress is a serious threat to sustainable crop production worldwide, especially in arid and semi-arid regions. A novel strategy to increase water use efficiency and long-term productivity is the application of biochar. Biochar aids in reducing the effects of drought stress in an affordable manner. This research aimed to determine whether biochar could improve the growth, physiological, and biochemical characteristics of *Laginaria siceraria* under drought stress. Following a pot experiment, the

impact of drought stress along with three different concentrations of biochar was analyzed on the growth of two varieties i.e., V1, Long and V2, Round of *Laginaria siceraria*. Four treatments were applied to each variety (1)control (2)drought (3)biochar only (500 mg/L, 1000 mg/L, 1500 mg/L) and (4)biochar in the presence of drought with each concentration. Drought stress was enforced by withholding irrigation water and biochar treatments were applied in the form of dilutions with intervals of two days at the vegetative stage of both varieties (V1 Long, V2 Round). Current results demonstrated that drought stress aggravates the features of plant growth with the uptake of proline concentration as well as regulation of SOD and CAT activities. In addition to these changes, a great reduction in photosynthetic activities like Y (II), Y (I), ETR-I and ETR-II, in both varieties of loki has also been observed in case of drought. Whereas, plants treated with biochar specifically with a concentration of 1500 mg/L profoundly affected the ability to protect PS II from photo inhibition by heat dissipation through the protective component of NPQ and down regulation of ETR to lower the ROS. Thus the application of biochar enhances the development of NPQ indirectly preventing drought-induced photo inhibition and enhancing the plant's photosynthetic efficiency. Conclusively, the addition of biochar enhanced the *L. siceraria* growth, nutrient uptake, and photosynthetic activity, and altered physiological and biochemical traits under water deficit conditions. It is recommended that the use of biochar can be crucial under drought stress circumstances which can improve the capacity of crops to withstand drought conditions.

Keywords: Biochar, drought stress, Loki, photosynthetic pigments, antioxidant activity



CHEMISTRY

Recognizing the Mechanism of Anti-cancerous Activity of Metal-Guanidinobenzimidazole through Computational Screening

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Abstract-DNA binding agents of ten exhibits dual behavior of simultaneous biniding with transcripot protein associated with cancerous cell development pathways. This simltanoeus protein bining if contributed to malfunctioning of pro-apoptotic proteins will reduce anticancerous potential. Therefore, DNA bining Metal (M) complexes of 2-guanidinoenimidazole (2GBZ) were synthesized with aim to enhance the DNA hooking ability of associated with partial planner structures of 1:2 M-2GBZ and were screened for proapoptotic enzyme protein binding too. The structures and stoichiometeries of syntehsized metal complexes were characterized by UV-Vis spectroscopy, cyclic voltammetry, FTIR, TGA, DSC and Single Crystal x-ray crystalloghrphy. The in-vitro DNA binidng ability was assayed through UV-Vis spectroscopy and cyclic voltammetry and DNA binding strength and binding modes were deduced. The 2GBZ and Ni-2GBZ exhibited exhibited groove binidng while groove binidng of Zn-2GBz induced unwinding of DNA through intercatatiev pi stacking. The bent structure of Co-2GBz was abe to hook beween DNA base pair and phospate backbone yielding electrostic blue shift in spectra. Binding constant revealed the M-2GBz to be strong binider of DNA molecule with the effect of enhanced cell cell kinlling potentail of M-2GBz against MCF-7 cell lines. Protein binding assay with interreated protein revealed insignificant intercation of M-2GBZ with portein at binidng receptor site revealing direct DNA binding

as mechanism of anticancerous activity of 2GBz and its metal compelxes.

Keywords: Anti-cancerous activity, DNA binding mode, cancer cell lines,

Mycogenic Synthesis of Ag/ZnO Nanocomposite for Antimicrobial Activity

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Abstract-Multidrug-resistant infections are a global health threat and a leading cause of death, despite available treatments due to antibiotic resistance, biofilms, and complex and resource-intensive antibiotic development processes. This study developed a silver/zinc oxide-based nano-antibiotic to combat clinical MDR and to treat biofilm-forming pathogens. The silver/zinc oxide (Ag/ZnO) NC was synthesized by using the metabolites of extremophile fungus i.e. *Meyerozyma guilliermondii*. The resulting Ag/ZnO nanocomposite was characterized physicochemically (e.g., UV-Visible (UV-Vis) spectrophotometry, Field Emission Scanning Electron Microscopy (FESEM), X-Ray Diffraction (XRD), and Fourier Transform Infrared Radiation (FTIR), and biologically (e.g., *in-vitro* antimicrobial, Antibiofilm, and hemolytic activities). Fungal metabolites were observed using Gas Chromatography Mass Spectrometry (GC-MS). Physicochemical analysis confirmed the successful mycosynthesis of Ag/ZnO NC, which displayed a crystalline polyhedral shape, and had an average particle size (PS) of approximately 38nm. Further, the FTIR study showed the reduction of salts (Silver nitrate, Zinc Oxide) by fungal metabolites. The Ag/ZnO appeared hemocompatible and had MIC of 0.23 µg/mL, and the highest activity (zone of inhibition (ZI) of 30 mm) was observed against *Staphylococcus aureus* compared with other tested strains (*Pseudomonas aeruginosa*, *Candida albicans*). Taken

together, Ag/ZnO NC can be suggested as a leading contender for controlling resistant microbes with reduced toxicity.

Keywords: Mycosynthesis, silver-zinc oxide, antimicrobial agent, nanocomposite, resistant bacteria

Fabrication and Assay of Quercetin-based Hydroxyl Radical Electrochemical Detectors

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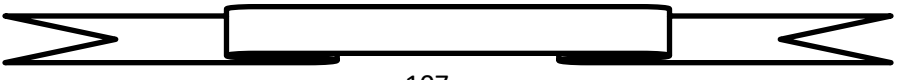
Abstract-Quercetin (Q) is a well-known antioxidant, belongs to the flavonols. Present study aims to utilize antioxidant capacity of quercetin (Q) for detection of extremely sensitive radicals like OH°. Therefore, the Cr(III) and Co(II) complexes were synthesized and characterized through FAAST analysis, UV-Visible Spectrometry, IR, TGA as well as cyclic voltammetry(CV). The results confirmed that M:L ratios for Co(II) & Cr(III) are 1:2 and 1:3 respectively. Following the antioxidant assay of quercetin and its metal complexes, the Q, Co-Q and Cr-Q immobilized over APTES/GC were tested for hydroxyl radical detection. The fabricated electrode showed better sensitivity towards OH° than for other radicals. All the fabricated electrodes showed linear detection response to OH° radical at a concentration as low as 0.1µM. The Q/APTES/GC and Cr-Q/APTES/GC showed optimum detection ability performance at pH 7.0 while pH for the best performance of Co-Q/APTES/GC sensor was pH-7.5. The Q/APTES/GC and Co-Q/APTES/GC demonstrated their highest detection ability at 25℃ while Cr-Q/APTES/GC sensor performed best at 30℃. Thus, the fabricated sensor can yield significant linearity of sensation.

Keywords: Hydroxyl radical sensors, fabricated electrodes, linearity of sensation



Aspergillus terreus Mediated Magnesium Oxide Nanoparticles Synthesis, Characterization, and Screening of Anticandidal Activity

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Abstract-The present study aimed to synthesize Magnesium Oxide (MgO) nanoparticles by fungus mold isolated from soil samples. Morphological and molecular characterization of the fungus sample was assessed and GC-MS analysis of the fungal extract showed a variety of compounds responsible for nanoparticle synthesis. The formation of MgO nanoparticles was estimated by a change in color from dark brown to light yellow after 24 hours of the reaction. MgO nanoparticles were characterized by XRD to ensure their purity and crystallinity, FESEM for morphological analysis, EDS for elemental analysis, and FTIR for functional group analysis. Fungal-mediated synthesis of MgO nanoparticles revealed the XRD sizes in the nanometer range and the purity and crystallinity of nanoparticles was confirmed. FESEM analysis revealed 2D nanoflakes of MgO and EDS showed the purity of the sample. Strong anticandidal activity was evaluated by MgO nanoparticles against *Candida albicans* and a remarkable increase in the zone of inhibitions was observed by increasing the concentration of nanoparticles. This study provides a new way to explore the utility of eco-friendly and cost-effective fungal-mediated synthesis of MgO nanoparticles for various pharmaceutical applications.

Keywords: *Aspergillus terreus*, *Candida albicans*, Anticandidal, MgO nanoparticles

Optimization of Various Parameters for Highly Capacitive N-doped Carbon Materials as an Electrochemical Supercapacitor's Electrode

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Abstract-The hierarchical porous nitrogen-doped carbon materials (NDCMs) were prepared from eriochrome black-T precursor via high temperature carbonization. The various experimental parameters; heating profiles, annealing temperature, and inert gas atmosphere during carbonization; and the effect of post-carbonization acid-etching was investigated. Further, supercapacitor testing of synthesized NDCMs as electrode material in different aqueous electrolytes was carried out. The synthesized materials were characterized by FTIR, Raman spectroscopy, XRD Diffraction, XPS, BET/BJH, SEM, EDS & TEM. Whereas, electrochemical investigations were performed by CV, GCD and Impedance spectroscopy. The results suggested that low annealing temperature, multistep heating profile, nitrogen atmosphere, 1.0 M $H_2SO_{4(aq)}$, and post acid etchings result in more suitable electrode material for supercapacitors subjected to various kind of doped nitrogen configurations, reasonable surface area and hierarchical porosity. The NDCMs prepared by multistep heating profile during carbonization exhibited superior physicochemical features viz reasonably high specific surface area (614 $m^2\ g^{-1}$ for $NCM_{(EBT)}$-700) with hierarchical porosity and three distinct types of functional nitrogenous viz pridinic (N-6), pyrrolic (N-5) and quaternary (N-Q). Moreover, $NCM_{(EBT)}$-700 demonstrated specific capacitance of 203 $F\ g^{-1}$ at 3 $A\ g^{-1}$, high rate capability and cyclic stability.

A DFT Study of Mn-Corrole as a Single Atom Catalyst for CO Oxidation

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Abstract- One of the effective methods for the abatement of CO is oxidation. Over the past 15-20 years, transition metal corroles have been introduced as a new approach to coordination chemistry for catalysis. Herein, we performed a DFT study to examine the catalytic potential of Mn-Corrole for CO oxidation. To achieve the maximum efficiency of the catalyst, a single-atom catalyst (SAC) is used. Mn atom supported by the macrocycle called corrole resulting in Mn-Corrole. Based on the E_{ads} (adsorption energy) results, the only possible mechanism (i.e., Eley Rideal mechanism) is studied. Optimizing the initial, transition, and final states of the reaction produces an energy profile that helps to examine the *E*a (Activation energy) of this reaction. Further charge transfer analysis of Mn-Corrole and ER mechanism was analyzed. The weak interactions between reactants and products are examined through NCI (Non-covalent interaction) analysis. This study will further pave the path for using macrocycles for catalytic applications.

Keywords: CO oxidation; DFT; Single atom catalysis; Non-Covalent-Interactions; QTAIM

Impedance Spectroscopic Analysis of PbSe Nanostructures Deposited by AACVD Approach

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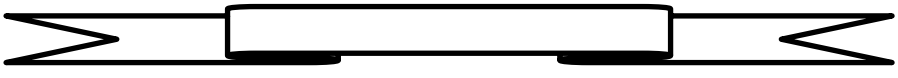
Abstract-This research endeavor aims to synthesize the Lead (II) diphenyldiselenophosphinate complex. Its utilization to obtain lead selenide nanostructured deposition as well as its dielectric cum impedance studies to discover its consumption in the electronic industry. AACVD was used to synthesize Lead selenide depositions by decomposition of the complex at different temperatures using a glass surface as a substrate. The obtained PbSe depositions were revealed to be a pure cubic phase and crystalline in nature as confirmed by x-ray diffraction analysis. SEM and TEM micrographs demonstrated three-dimensionally grown interlocked or aggregated nanocubes of obtained PbSe. Characteristic dielectric measurements along with impedance spectroscopic analysis at room temperature were executed for obtained PbSe within frequency range variation between 100Hz - 5MHz. The dielectric constant and dielectric loss gave similar behavior along with altering frequency which was well explained by Koops theory and Maxwell–Wagner theory. The effective short range translational hopping gave rise to an overdue remarkable drift of ac conductivity (σ_{ac}) along with the elevation in frequency. Two relaxation processes caused by grains and grain boundaries were identified from the fitting of a complex impedance plot with an equivalent circuit model (R_g C_g) (R_{gb} Q_{gb} C_{gb}). Asymmetry and depression in the semicircle having center present lower than the impedance real axis gave solid justification of dielectric behavior that is non-Debye in nature.

Keywords: Lead chalcogenide; AACVD; nanostructured deposition; impedance analysis



Synthesis, Structural and *in vitro* Biological Evaluation of Carbothioamides

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Abstract-The current research covers the facile synthesis, successful X-ray diffraction and spectroscopic characterization, surface analysis, and in vitro antibacterial, antifungal, and detailed antioxidant evaluation of differently substituted carbothioamide derivatives. Consequently, Hirshfeld surface analysis depicted hydrogen bonding, and van der Waals forces as crucial for structural packing. Moreover, the biologically screened derivatives were found to be highly active against the tested bacterial and fungal strains. Similarly, most of the screened carbothioamide derivatives exhibited excellent total oxidizing, total reducing and DPPH scavenging potential. Their molecular docking simulation offered additional information regarding possibilities of their inhibitory role against RNA. Docking evaluation coupled with in silico investigation of the binding pattern explored that the screened compounds could serve as potential surrogate for design of novel and potent antibacterial agents. Results of the in vitro biological assays were promising with the identification of the screened compounds as the lead and selective candidate for RNA inhibition. Moreover, results of docking computations ascertained the inhibitory potential of the screened compounds, and it can be suggested that these compounds can serve as a structural model for the design of antibacterial agents with better inhibitory potential.

Key words: Synthesis, X-ray diffraction, Hirshfeld surface analysis, Bacteria, Fungi, Free radicals, Molecular docking

Enhanced Recovery of Bio-Oils from Algae through Pretreatment

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Abstract-In the discipline of renewable energy, where progress is measured by the currency of innovation, a diminutive yet powerful

organism holds the potential for a more environmentally friendly future. Algae, the microscopic powerhouses of photosynthesis, have emerged as a symbol of optimism in the search for sustainable fuels. The main goal of pretreatment is to use readily available biomass of algae from the natural waster channels with maximum lipid recovery. The main objective of current study was: Isolation of competent algal strains, Comparison of pretreatment to be enhance biolipid recovery from algal biomass, transesterification for bio-diesel production. Briefly the algal samples were collected followed by the isolation of algae, however the overall pretreatment was applied to consortium of the isolated strains. Four pretreatments were applied owing to their economic feasibility, acid pretreatment, base pretreatment, microwave, and high-pressure steam pretreatment the extracted lipids were trans esterified further to detect their potential to be used as biofuels. By using single cell technique, we isolate 3 algal species.

CHG01 ➔ Green – 01
CHB02 ➔ Brown – 02
CHB03 ➔ Brown – 03

From HPS treatment high lipid yield 96.9% were obtained and according to theoretical yield for 1kg is 320.86 and statistical yield 222.3% lipid recovery from 1kg.

Keywords: Biofuels, algae, Lipid, Recovery, Species of Algae.

Flood Susceptibility in The Indus Region Based On MCDA

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Abstract- Floods are one of the most widespread natural hazards occurring across the globe. Pakistan has historically been subjected

to high flooding fatality events due to its socioeconomic characteristics, population geography, and landscape attributes. Identification of flood susceptible areas is vital for flood risk management along with disaster handling. The aim of the study was to apply Multi-criteria decision Analysis approach to locate high flood-prone areas around the Indus region to assess the susceptibility conditions to flood events in the Indus region, develop an integrated flood susceptibility assessment map and compare the pre and post-flood scenario of 2022 and predict the vulnerability of the Indus region. Multi-criterion decision analysis in ArcMap for our study was performed through a geo-processing technique called "Weighted analysis". The Weighted Sum function provides the ability to weigh and combine multiple inputs to create an integrated analysis. The layers were assigned specific weights based on expert opinions and literature review, reflecting their respective influence making the region susceptible to flood. The susceptibility map was categorized into classes from High to low susceptible zones. Eight factors were considered that could influence the susceptibility of floods, including elevation, slope, aspect, topographic wetness index, soil water content, land use land cover, precipitation, and temperature. The findings of this study revealed that March had more high flood-susceptibility zones than October. The regions of Punjab and Sindh face significant vulnerability to flooding-more around March-due to their topography and rainfall patterns. MCDA is one of the most cost-effective, and efficient techniques in identifying and mapping flood-prone areas, enabling more effective management of flood risks. This research also sheds light on the importance of early assessment and prediction of upcoming natural disasters which can aid in mitigating adverse impacts these disasters cause.

Key words: Natural hazards, Flood susceptibility mapping, Remote sensing, Weighted analysis, Multi-criteria decision analysis

Synthesis and Investigation of Aggregation Induced Emission Properties of Tetraphenylethylene Derivatives

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Abstract-Tetraphenylethene (TPE) and its derivatives have potential sensing applications due to their aggregation induced emission (AIE) property. Diverse range of structural motifs on TPE makes it strong mechanoluminescent material that has been used for sensing of various analytes. Our aim was to develop TPE derivatives from substituted benzophenones in order to disseminate their AIE behavior. Desired benzophenones were accomplished by reacting 4-hydroxybenzophenone with 1,3-dibromopropane. TPE analogue was synthesized under McMurry reaction conditions (TiCl4/Zn, dry THF) by the self-coupling of substituted benzophenone. Characterization of synthesized compounds was done using 1H-NMR and 13C-NMR spectroscopy. To investigate the sensing potential, TPE analogue was optimized through fluorescence spectroscopy. Maximum emission was exhibited at 600 μM by examining the solutions of various concentrations in THF ranging from 800 to 50 μM. AIE properties of TPE analogue was studied in H2O/THF fractions. The maximum emission intensity of our synthesized compound was obtained in H2O/THF (90:10) mixture due to desired aggregate formation in this concentration.

Key words: Tetraphenylethylene, historical background, synthesis, biological and flourescence applications

Facile Synthesis of Highly Fe-doped ZnO Nanoparticles by One-Step Solution Plasma Process

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Abstract-Diluted magnetic semiconductors (DMSs) have the advantage of exhibiting both ferromagnetic and semiconducting properties in a single material by substitution of transition-metal (TM)/rare-earth ions. Among DMSs, TM-doped ZnO is a promising candidate considering its chemical and thermal stability with a wide band gap. Among TMs, Fe ions are preferred because of their large effective magnetic moments. Herein, we report a one-step synthesis of highly Fe-doped ZnO nanoparticles (NPs) by a solution plasma process (SPP) using $FeCl_2$ and $FeCl_3$ as precursors without any addition of chemicals. Breakdown of water bubbles caused by plasma discharge led to the formation of hydroxyl radicals, which reacted with the dissolved Zn^{2+} ions producing $Zn(OH)_2$ that was indeed converted to ZnO through thermal dehydration. Meanwhile, Fe ions were incorporated into the host ZnO lattice during the synthesis process. Fe- doping levels in $Zn_{1-x}Fe_xO$ NPs can be tuned by changing the Fe-precursor concentration and plasma discharging time. We achieved high doping content (x) of up to 0.46 within 30 min, which is difficult to achieve using traditional solution-based synthesis approaches. All $Zn_{1-x}Fe_xO$ NPs exhibit ferromagnetic behavior but the magnitude is strongly dependent on Fe^{2+} to Fe^{3+} ions' ratio, which are explained by the dominance and competition between the ferromagnetic and antiferromagnetic exchange interactions through the presence of mixed Fe^{2+} and Fe^{3+} ions The observed optimal ratio of Fe^{2+} to Fe^{3+} for maximizing the magnetization is approximately 3:7. SPP has a great potential as an alternative strategy for the synthesis of highly Fe-doped ZnO NPs, which can be expanded to the synthesis of other doped metal-oxide nanostructures for a broad range of research applications.

Keywords: Solution plasma process, ZnO nanoparticles, Fe doping, Magnetization, One-step solution-based method

Potential of A^3-coupling Reaction towards the Synthesis of Medicinally Important Heterocyclic Motifs: Our Efforts

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Abstract-With increasing demand of new entities in medicinal and pharmaceutical industry, the need of new synthetic strategies especially using cheap and earth abundant starting materials is highly wished. Since its discovery, the A^3-coupling reaction has emerged as a most versatile strategy for constructing variety of Nitrogen containing heterocyclic compounds. The presence of C≡C triple bond and amino nitrogen in the initially formed propargylamine facilitates the reaction both intramolecular and intermolecular cyclization. Our group is currently focusing to explore the further latent potential of this reaction using variety of starting aldehydes, amines and alkynes. Under this project we have successfully synthesized the *tri-* and *tetra* substituted propargylamines, dihydropyridines, azetidines, thiazolidines and carbazolyl thiazolidinones using accomplished using A^3-, KA^2- and IA^2-couplings. This talk will focus on our work on A^3-coupling.

Keywords: Hetrocycles; A^3-coupling; KA^2-coupling; Azetidines; Dihydropyridines

Synthesis of Microgel Fabricated with Silver Nanoparticles for Catalytic Applications

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Abstract-In this work, n-isopropyl acrylamide and vinyl sulfonic acid were copolymerized and crosslinked simultaneously to synthesize a microgel system. The obtained microgel system was fabricated with catalytically active silver nanoparticles and its catalytic potential was investigated. For characterization, the prepared catalysts were examined with Fourier transformation infra-red spectroscopy, UV-Visible spectroscopy, X-ray diffraction, laser light scattering, thermal gravimetric analysis, and differential scanning calorimetry. The formation and stabilization of silver nanoparticles was indicated by colorimetric and X-ray diffraction analysis. The laser light scattering analysis showed that particles size of microgel was in the range of 150 nm to 490 nm with maximum particles having diameters around 270 nm. A decrease in the particle size of microgel was observed after the fabrication of silver nanoparticles. The catalytic potential of the obtained silver nanoparticle-microgel nanocomposite catalyst was investigated in the reduction of 4-nitroaniline and 4-nitrophenol which are considered as toxic water pollutants. The catalytic potential of the obtained silver nanoparticle-microgel nanocomposite catalyst was also investigated the reduction of methyl orange dye. The catalytic reactions were performed under varying conditions of temperature, and catalyst quantities. The thermodynamic parameters such as activation energy, activation entropy change, activation enthalpy change, and Gibb's free energy were also calculated. The reduction rates of 4-NP, 4-NA, and MO were found to be 0.061, 0.145 and 0.154 min^{-1}, respectively. This study reveals that our prepared microgels can be used for the synthesis and stabilization for other catalytically active metal nanoparticles and their catalytic applications can also be extended for many other reactions.

Keywords: *microgel, silver nanoparticles, catalyst, 4-nitrophenol, 4-nitroaniline.*

Design, Synthesis, and Evaluation of Acetylcholinesterase and Butyrylcholinesterase Dual-Target Inhibitor against Alzheimer's Diseases

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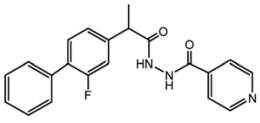
Abstract-For the Alzheimer's disease (AD) with complex pathogenesis, single target drugs represent one of the most effective therapeutic strategies in clinical. However, the traditional concept of "a disease, a target" is difficult to find very effective drugs, and multi-target drugs have already become new hot spot in drug development for this disease. In our present study, our efforts toward discovering new cholinesterase (ChE) inhibitors, we have designed and synthesized Novel compound (**1**) based on combination of flurbiprofen and isoniazide and shows 2.5 times enhanced acetylcholinesterase (AChE) inhibition activity and 1.7 times improved butyrylcholinesterase (BuChE) inhibition activity compared to flurbiprofen and a standard drug (i.e. physostigmine). AChE and BuChE inhibition activity alongside docking results suggests that compound (1) could be used for treatment of Alzheimer's disease. Moreover, compound (1) also exhibit better a-chymotrypsin activity compared to flurbiprofen. Furthermore, in vitro and in vivo analysis confirmed that compound (1) exhibit more activity and less toxicity than the parent compounds. The results suggest that our compound (**1**) has the potential for further development as a supplement to treat Alzheimer's disease.



Compound 1

Key words: Alzheimer's disease Therapes Acetylcholinesterase Butyrylcholinesterase

Photosensitizers with Superior Photovoltaic Performance in DSSCs

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Abstract-In this work, we report the design and successful synthesis of two new heteroleptic polypyridyl Ru (II) complexes (SD-5 and SD-6), by incorporating hetero-aromatic electron-donating *N*-alkyl-2-phenylindole moieties into the ancillary ligand. These novel ruthenium complexes were used as photosensitizers for dye-sensitized solar cells. The primary objective was to investigate the electron donating effect of the indole segments on the photo-related properties and the influence of the length of terminal alkyl chains tethered to N-indole on the charge recombination resistance. The chemical structures of both targeted compounds were confirmed via FT-IR, ^{1}H-NMR and mass spectrometry. Under the same device fabrication conditions, the photovoltaic performance of SD-6 outperformed that of SD-5 and N719 with an overall efficiency of 8.14% (J_{SC} = 19.21 mA cm^2, V_{OC} = 0.675 V and FF = 62.7%), compared to 7.74% of N719 and 4.99% of SD-5. The enhanced photovoltaic power of SD-6 can be attributed to the presence of long alkyl antennas (–C18H37) in SD-6; it reduced the intermolecular aggregation of dyes and suppressed charge recombination, thus resulting in enhanced J_{SC} and V_{OC} values, respectively, compared to its analog SD-5. Furthermore, the presence of indole moieties with long alkyl chains in the ancillary ligand enhanced the photovoltaic performance compared to N719 with bi-anchoring ligands.

Keywords: Dye-sensitized solar cell, Ancillary ligands, FTIR, Photosensitizer, N719

Graphene Oxide-Silver Nano Composite Synthesis for Removal of Multiple Pollutants by Adsorption, Catalysis and Antibacterial Activity

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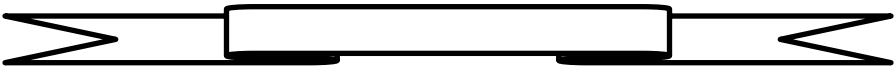
Abstract-We reported facile one-step synthesis of Graphene oxide–silver (GO–Ag) nanocomposite and its applications as an adsorbent for elimination of some toxic pollutants from aqueous medium, as an efficient catalyst in the individual as well as simultaneous reduction of multiple compounds and as an antibacterial agent for the destruction of some harmful microorganism's existent in wastewater. GO was prepared using modified Hummers method and Ag nanoparticles were integrated on GO sheets by chemical reduction of Ag+ ions on GO sheets. Composition and morphology of the nanocomposite was extensively characterized with elemental dispersive X-ray analysis (EDX), Fourier transform infra-red (FT-IR) spectroscopy, transmission electron microscopy (TEM), field emission scanning electron microscopy (FESEM), X-ray diffraction (XRD), and thermal gravimetric analysis (TGA). GO–Ag nanocomposite demonstrated remarkable adsorption capacities and recyclability for malachite green (MG) and ethyl violet (EV) dyes. Various experimental parameters affecting adsorptive behavior of nanocomposite like temperature, pH, contact time between dye and adsorbent and adsorbent dose were evaluated thoroughly. Experimental data was also simulated with different adsorption isotherms and kinetic models to evaluate adsorption behavior of both dyes and results confirmed that adsorption process followed pseudo 2nd order kinetic model and Langmuir adsorption model. Moreover, regeneration of both dyes in suitable media was also confirmed without any loss in removal efficiency. The catalytic performance for 2-nitroaniline (2-NA) reduction was investigated in

detail. Most importantly, prepared nanocomposite was found to have potential to adsorb multiple pollutants all together as well as to catalyze the simultaneous reduction of a mixture of dyes (MG, MO, and EV) and 2-NA. An additional advantage of GO-Ag nanocomposite was its antibacterial activity linked with the presence of Ag nanoparticles. Two bacterial strains (Gram-negative bacterium, E. coli and the Gram-positive bacterium, S. aureus) were used to test antibacterial activity of composite and results confirmed remarkable performance of the nanocomposite in destroying harmful pathogens.

Key words: adrotpion, graphene oxide, catalysis



Performance of Pyrocatechol Violet and Carminic acid Sensitized ZnO/CdS Nanostructured Photoactive Materials for Dye Sensitized Solar Cell

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Abstract-The heterojunction solid-state DSSCs were investigated to address the shortcomings of liquid electrolyte-based DSSCs. ZnO and CdS deposited ZnO nanostructured materials were successfully synthesized by using co-precipitation and ultra-sonication methods, respectively. A comparative study of the sensitization of, ZnO and nanostructured (ZnO/CdS) was carried out by using two different organic dyes (carminic acid and pyrocatechol violet). The application of sensitized materials for solid-state dye-sensitized solar cells (DSSCs) is reported. The characterization of the materials was done by using x-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV-Visible spectroscopy, and Fourier transform infrared spectroscopy (FT-IR). The SEM and TEM results showed that the surface of ZnO nano spheres is well covered with CdS. The UV-Visible spectrum

showed the rise of a new optical band due to CdS deposition which effectively tuned the band gap of ZnO from 3.12 eV to 2.53 eV. XRD analysis revealed the successful formation of hexagonal phases of CdS and ZnO. The materials were applied as photoanodes in DSSCs with and without dye sensitization. P3HT (Poly (3-hexylthiophene) was used as a hole conducting polymer. CdS deposition and sensitization with different dyes showed a significant effect on the overall efficiency of fabricated devices. The ZnO/CdS based DSSC sensitized with carminic acid showed a current density (J_{sc}) of 8.72 mA/cm^2 with an open-circuit voltage (V_{oc}) of 0.43 V and overall efficiency of 1.42%. While the same photoanode material sensitized with pyrocatechol violet gave J_{sc} value of 9.13 mA/cm^2 with a V_{oc} of 0.39 V and overall efficiency of 1.55%. Among all the devices the best efficiency was observed for devices sensitized with N719 by using liquid electrolyte and comparable efficiency by using Pyrocatechol violet dye in solid-state DSSC.

Keywords: DSSCs, I-V, solid state, nanostructures

Synthesis, SAR Elucidations and Molecular Docking study of Newly Designed Isatin Based Oxadiazole Analogs as Potent Inhibitors of Thymidine Phosphorylase

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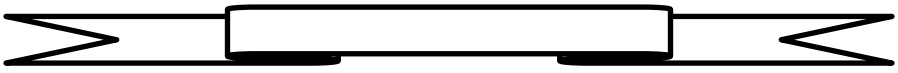
Abstract-Thymidine phosphorylase is an enzyme involved in pyrimidine salvage pathway that is identical to platelet derived endothelial cell growth factor (PD-ECGF) and gliostatin. It is enormously regulated in a variety of solid tumors. Furthermore, surpassing TP level protects tumor cells from apoptosis and helps cell survival. Thus, TP is identified as a prime target for developing novel anticancer therapies. A new class of exceptionally potent isatin based oxadiazole (1–30) has been synthesized and evaluated for thymidine phosphorylase inhibitory potential. All analogs

showed potent thymidine phosphorylase inhibition when compared with standard 7-Deazaxanthine, 7DX (IC50=38.68 ± 1.12 μM). Molecular docking study was performed in order to determine the binding interaction of these newly synthesized compounds, which revealed that these synthesized compounds established stronger hydrogen bonding network with active site of residues as compare to the standard compound 7DX.

Key words: Thymidine phosphorylase, Molecular docking, tumor cells



Azadirachta indica Assisted green Synthesis of Magnetic Ag/GO-Fe3O4 Nanocomposite for Solid Phase Extraction of Tetracyclines from Milk

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Abstract-Antibiotics are frequently used as growth boosters in animal husbandry. Tetracyclines (TCNs) are among the antibiotics which are utilized largely compared to other antibiotics. Thus, monitoring of tetracyclines is paramount, especially in the feedstuff. In the present study, a green method is developed to synthesize magnetic Ag/GO-Fe3O4 nanocomposite for residual extraction of oxytetracycline and chlortetracycline in the milk. The extraction procedure involved the deproteinization of milk, magnetic solid-phase extraction and quantification by HPLC with a UV detector. Different factors that affected the adsorption capacity of the adsorbent were studied like p H, temperature, amount of nanocomposite, and time. The inter-day and intra-day precision were calculated for oxytetracycline (4 and 6%) and chlortetracycline (3 and 4%) respectively. The limit of detection and quantification

for oxytetracycline was 0.5 and 1.5 μg L−1 and for chlortetracycline was 0.2 and 0.6 μg L−1 respectively and percentage extraction was 94-96%.

Key Words: Magnetic solid-phase extraction; Green synthesis; magnetic Ag/GO-Fe3O4; Tetracyclines; HPLC, UV

MATHEMATICS

The Study of Topological Indices via M-polynomial Approach of Triangular Boron Nanotube

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Abstract-Molecular topology is a prominent chemical graph theory field with many uses in specific areas of science like pharmacology, chemistry, biology and many more. Topological descriptors help to observe the connection between the physicochemical properties and the shape of the chemical substance. The M-polynomial is emerging as an efficient tool to recover degree-based topological indices in chemical graph theory. This talk aims to provide some novel formulas for degree-based topological descriptors via the M-polynomial. The names of the topological indices are redefined Zagreb indices, modified first Zagreb index, nano Zagreb index, second hyper Zagreb index, edge version of first Zagreb index, Randić index, reciprocal Randić index, reduced reciprocal Randić index, *SK* indices, first arithmetic geometric index, sum connectivity index, general sum connectivity index, first Gourava index and product connectivity Gourava index. This talk also aims to inspect the boron alpha nanotube through topological indices via M-polynomial. The presented results are valuable contributions to existing knowledge.

Keywords: Triangular boron nanotube, chemical graph theory, M-polynomial, molecular structure, degree dependent topological indices.

Gravitational Collapse of Friedmann-Robertson-Walke (FLRW) Universe

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Abstract-In this Talk, we study the Friedman universe gravitational dust collapse in the $f(R,T)$ theory of gravity. We are considering the Friedmann-Robertson-Walker metric as the interior region and the Schwarzschild metric as the exterior region of the star. To match

both boundaries of the star we have used Dormois junction conditions. By selecting a specific $f(R,T)$ model, i.e. $f(R,T) = R + 2f$ (T) and utilizing the Ricci scalar and trace of energy-momentum tensor as constant quantities, the highly nonlinear field equations may be calculated. The gravitational mass of the system that is collapsing has been calculated. We also describe the time creation of the apparent horizons. We discovered that the phrase $2\lambda(0)\,\rho c - f(Rc,Tc)$ works as a cosmological constant and also slows the gravitational collapse process.

Keywords: Gravitational Collapse and Modified theory of gravity.

Spikes Leads to large scale structures like Galaxies

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Abstract-The Geroch/Stephani transformation is a solution-generating transformation and may generate spiky solutions. In this talk I will present a mechanism to analysis different kinds of Spike. Furthermore, I will also explain how spiky solutions lead to large scale structure like galaxies.

Keywords: Spikes, Galaxies, Cosmology, Stephanie Transformation.

On Sobolev theorem for higher commutators of fractional integrals in grand variable Herz spaces

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Abstract-The idea of grand variable Herz spaces we discussed in detail and will obtain the Sobolev type theorem for commutators of fractional integrals in grand variable Herz spaces.
Keywords: Lebesgue spaces, BMO spaces, weighted estimates, {fractional integrals operators}, grand Herz spaces.

Alliances in graphs and graph security

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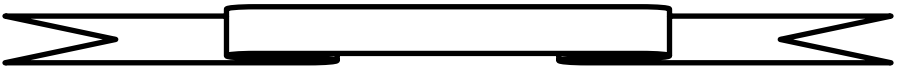
Abstract-Alliances in graphs are subsets of vertices satisfying certain conditions. Some important alliances are defensive, offensive and powerful alliances in graphs. A similar concept is graph security number. It is the minimum number of vertices in a graph that form a secure set of vertices. These notions have applications in modern town planning, worldwide strategic studies and graph-based games designing.
Keywords: *Graph security and games designing*



Direct approach for the fractional view analysis of heat and wave equations

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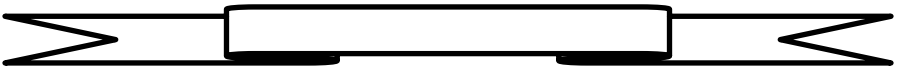
Abstract-The fractional novel analytical method (FNAM) is used in this article to solve fractional-order heat and wave equations. The fractional-order heat and wave equations' series form solutions are found using the suggested approach. To comprehend the FNAM

technique, several numerical examples are provided. Other nonlinear problems may be solved with ease using the natural transform decomposition technique process, which has demonstrated minimal volume of computations and a high rate of convergence. As a result, FNAM is regarded as one of the best analytical methods for solving fractional-order linear and nonlinear equations. fractional-order heat and wave equations, in particular, partial differential equations.

Keywords: Caputo operator fractional novel analytical method Heat and wave-like equation



Zero-Dimensional Modeling and Simulation of Diesel Engine

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Abstract

The designing and mentoring of diesel engines require more reliable models. The modeling of zero-dimensional (Zero-D) flows in the combustion chamber of internal combustion engines is described by two models. One is single zone and the other is two-zone Zero D engine model. The simplest approach in engine modeling to predict the efficiency and performance of diesel engines is to treat the cylinder contents as a zone. For this, we have to develop a Zero D single-zone model in which we discussed different engine cycles (Otto cycle, Diesel cycle, Dual cycle and Finite energy release cycle) with MATLAB simulations. Then formed the energy release model by using single-Wiebe function to check the efficiency and indicated mean effective pressure (IMP) at different energy release values. We expand the single-zone model after including the heat loss, mass loss as a function of thermodynamic properties. Then

formed the four dimensionless ordinary differential equations to predict the behavior of heat loss, mass loss, work done and change in pressure, volume as a function of crank angle. Also include the intake and exhaust pressure to predict the behavior of volumetric efficiency and gas residual fraction. For the two-zone model, split the single-zone model into two zones, one for a burned fraction and the other for an unburned fraction. For further calculation formed the dimensionless ordinary differential equations to predict the behavior of temperature in both burned and unburned zone, heat leakage, heat transfer, work done and pressure profile, as a function of crank angle. This two-zone model is also implemented through the MATLAB code. The results are also verified by comparing the FORTRAN codes. Further in future, the chemical model modified by including the different fuels and all the models also modified to predict the performance of two-stroke engine.

Keywords: Single-Wiebe-function, Zero-D model, Diesel engine modelling, Simulation, Indicated mean effective pressure, MATLAB

Mathematical Study of Blood Flow in Catheterized Diverging Tapered Stenosed Arteries with Emerging Shaped Nanoparticles: Application in Cancer Therapy

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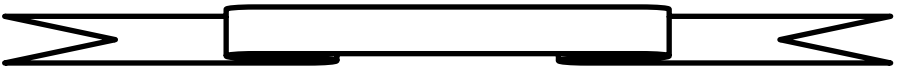
Abstract

The magnetic force effects and differently shaped nano-particles in diverging tapering arteries having stenoses are being studied in current research via blood flow model. There hasn't been any research done on using metallic nanoparticles of different shapes with water as the base fluid. A radially symmetric but axially non-symmetric stenosis is used to depict the blood flow. Another

significant aspect of our research is the study of symmetrical distribution of wall shearing stresses in connection with resistive impedance, as well as the rise of these quantities with the progression of stenosis. Exact solutions for different flow quantities namely velocity, temperature, resistance impedance, boundary shear stress, and shearing stress at the stenosis throat, have been assessed. For various parameters of relevance for Cu-water, the graphical results of several types of tapered arteries (i.e. diverging tapering) have been explored.

Keywords: Cu-water, Nanofluid, Shaped nanoparticles, Blood flow, diverging tapered arteries, Exact solution



Thermal Enhancement of Nano-Fluidic Transport Confined Between Disk and Cone Both Rotating with Distinct Angular Velocities and Heat Transfer

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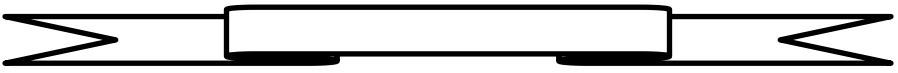
Abstract

Purpose–This paper aims to study the fluid flow and heat transfer within the Casson nanofluid confined between disk and cone both rotating with distinct velocities. For a comprehensive investigation, two distinct nano-size particles, namely, silicon dioxide and silicon carbide, are submerged in ethanol taken as the base fluid. Design/methodology/approach–This paper explores the disk and cone contraption mostly encountered for viscosity measurement in various industrial applications such as the lubrication industry, hydraulic brakes, pharmaceutical industry, petroleum and gas industry, and chemical industry. Findings–It is worth mentioning here that the radially varying temperature profile at the disk surface is taken into account. The effect of prominent emerging parameters on velocity field and temperature distribution are studied graphically, while bar graphs are drawn to examine the physical

quantities of industrial interest such as surface drag force and heat transfer rate at disk and cone. Originality/value–To the best of the authors' knowledge, no study in the literature exists that discusses the thermal enhancement of nano-fluidic transport confined between disk and cone both rotating with distinct angular velocities with heat transfer.

Keywords: Conical gap, Rotation, Silicon dioxide, temperature, transfer rate



Theoretical Study of (Gold+ Platinum / water) nanofluid with variable viscosity driven through Peristaltic Flow Phenomenon

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Abstract-The nano heat transport has acquired a lot of importance in ongoing time. The miniature level plans are engaged successfully in assorted fields like biomedical, hardware, navel structures, assembling, transference, and car ventures to further develop the intensity move for cooling and heating. The main reason of selecting this geometry is the usefulness in Laparoscopy and Anastomosis. Attributable to this reality, the ongoing article outlines the highlights of variable viscosity, heat source/sink feature with wall properties in peristaltic transference of hybrid nanoliquid. A hybrid nanomaterial framework is ready by scattering platinum and gold nanomaterials in a base fluid (water). Thermal boundary conditions for temperature are likewise utilized. The flow is done in a non-uniform inclined tube where the walls of tube are adaptable in nature. Nanoparticle's shapes impact is likewise consolidated in flow examination. Under the thought of low Reynold's number and long wavelength, the relevant conditions are diminished by carrying out non-dimensional variables. The acquired dimensionless model

is then mathematically settled and obtains an exact solution. Involved relevant boundaries impact the peristaltic flow attributes are shown graphically and talked about compactly.

Keywords: Horizontal channel, non-Newtonian fluid, MHD, Cilia-driven flow, Numerical solution

Metachronal Wave Impact in a Channel Flow of Prandtl Fluid Model

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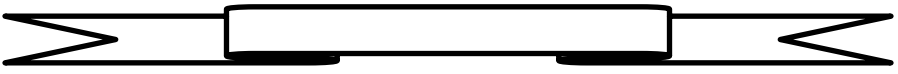
Abstract-In modern-day science and medics, scholars are focusing on the behavioral study of non-Newtonian fluid and its relevance with ciliated motion in human body. This would offer advanced avenues of research to mitigate the risks of new and contagious diseases relating to various systems in the human body. This manuscript focuses on the behavior of metachronal waves in Prandtl fluid generated by ciliated movement through a uniform tapering channel once magnetic field is applied to the fluid. The theoretical approach raises mathematical calculations and results obtained presented highly nonlinear system of PDEs. Latterly, ODEs are developed which accrue accurate results by using scaling group of transformations. Second, approximation of long wavelength and low Reynold's number used to analyse the flow motion caused by metachronal waves. The emerging equations achieved are further solved numerically using the bvp4c method. Results are engendered through graphical attempt of velocity, temperature, pressure

gradient, pressure rise and wall shear stress graphs in relation to various factors. It can be inferred that theoretical impact of velocity profile for magnetic parameter decreases near the walls of the ciliated channel while increases in the middle of channel. It concludes that magnetic field opposes the strength of the flow close to the walls. Another observation is the flow of temperature across the subject domain is accelerated by the Brinkman number. Thus, the flow of heat transfer may be increased by the fast metachronal wave and fixed initial temperature. While streamlines are also fabricated to exhibit the flow phenomenon of ciliary motion.

Keywords: Horizontal channel, non-Newtonian fluid, MHD, Cilia-driven flow, Numerical solution



Axisymmetric Flow of Casson Fluid by a Swirling Cylinder under Generalized Fourier Law

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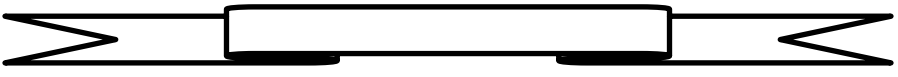
Abstract-In this article, we will look at the axisymmetric flow of Casson fluid due to stretching and swirling motion of cylinder. Thermal radiation and Cattaneo-Christov heat flux are also investigated. To convert the PDEs involved in the problem into non-linear ODEs suitable transformations are used and then the absolute results for velocity and temperature profiles are obtained using MATLAB's built-in function bvp4c. Additionally, tables and graphs are plotted to delineate the results. In the limiting scenario, a comparison with previously published results is also provided.

Keywords: Casson Fluid Swirling Cylinder



Computational Intelligence Approach for Optimising MHD Casson Ternary Hybrid Nanofluid over the Shrinking Sheet with the Effects of Radiation

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Abstract-This study aims to introduce an innovative computational intelligence approach utilizing the AI-based Levenberg–Marquardt scheme coupled with backpropagated neural networks (LMS-BPNN) to optimize the behavior of MHD ternary hybrid nanofluids within a porous shrinking sheet exposed to thermal radiation (Rd). The governing partial differential equations (PDEs) governing the Casson ternary hybrid nanofluid are transformed into a set of ordinary differential equations (ODEs) through suitable transformations. The numerical dataset is generated as a reference using the bvp4c function in MATLAB, with variations in Casson fluid parameters (β), magnetic field (M), porosity (S), nanoparticle concentrations ($\phi1$=$\phi2$=$\phi3$), and thermal radiation (Rd) effects considered across all scenarios involving LMS-BPNN. The dataset is divided into training (80%), testing (10%), and validation (10%) portions for LMS-BPNN, enabling the analysis of the estimated solution and its comparison with a numerical solution obtained using bvp4c. The efficacy and consistency of LMS-BPNN are validated through fitness curves based on mean squared error (MSE), regression analysis, correlation index (R), and error histogram. The findings reveal that the velocity decreases with increasing β, while it increases with higher M. Moreover, the concentrations of nanoparticles and thermal radiations exhibit increasing effects on (0). To assess the reliability and accuracy of the numerical simulation data, error analysis is conducted, which

includes an examination of absolute errors. Notably, the error between the numerical values and AI-predicted values is approximately 10^{-6}, demonstrating the consistency and reliability of the developed AI algorithm.

Keywords: Casson hybrid nanofluid; artificial neural networking; MHD; thermal analysis; Porous sheet

Propulsion of Taylor's swimming sheet through rheological mucus

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Abstract-We present a complete simulation method to compute the propelling speed of a two-dimensional Taylor's sheet. Integrating complex wavy passage comprising non-Newtonian Carreau fluid, we investigate the classical swimming mechanism at low Reynolds number. In the case of micro-swimmers, the amount of stress because of inertia is way smaller than that due to viscous forces. The self-propulsion of the organism pack creates a creeping flow. The mathematical modeling with all these physical conditions leads us to a non-linear boundary value problem. The solution is obtained via a numerical solver which is further utilized in balance conditions to calculate the propelling speed. Three different cases (passive, simple active, and complex active) of the bounded passage are elaborated with the shear-thinning and shear-thickening nature of the mucus. Finally, the assistive swimming conditions are presented.

Keywords: Taylor's swimming sheet, Complex wavy passage, Reynolds number, Numerical solver.

Comparison of Levenberg-Marquardt and Bayesian Regularization Backpropagation Based Networks for Solving Differential Equations

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Abstract-This manuscript focuses on comparing two optimization algorithms used for training Artificial Neural Networks (ANNs) that are capable of fitting the solution to linear and nonlinear ordinary differential equations. An Artificial Neural Network (ANN) is an information-processing paradigm inspired by how biological nervous systems such as the brain process information. We compared the processes based on Levenberg Marquardt (LM) and Bayesian Regularization Backpropagation (BRBP) schemes. For comparison, we have fed the same data to both networks. Data was distributed in three sets in a 70-15-15 percentage scheme for training testing and validation, respectively. We have used the same number of hidden layers (one), neurons (6), and epochs (500) for both approaches. Expect the optimization algorithms, we have kept everything the same for both the networks to compare their performance. We have analyzed function fit plots, regression plots, transition plots, and comparison plots to make a detailed analysis of both algorithms. With the help of several examples, we have shown that ANN-LMM and ANN-BRBPM can both be applied to fit the solution to linear as well as nonlinear ordinary differential equations (ODEs). However, the ANN-BRBP method outperforms the ANN-LM method in many ways and we get more accurate and reliable results by using Bayesian Regularization Back Propagation. It also prevents overfitting and is able to handle complex data with more flexibility and accuracy.

Keywords: Neural Networks, ordinary differential equations, Levenberg-Marquardt (LM) method, Bayesian Regularization (BR) Backpropagation method.

PHYSICS

Basics of Photo-Acoustics for Gas and Aerosol Concentration Measurements

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Abstract- The application of PA setup for gas sensing is almost a century old but its potential for ultra-sensitive and miniaturized devices is still not fully explored. The photoacoustic (PA) spectroscopy is a zero-background measurement which is suitable for the direct measurement of optical absorption, because the generated sound signal is proportional to the absorbed light energy and concentration of the light-absorbing component can be calculated from the optical absorption. A PA signal is generated by modulated light with wavelength coinciding with an absorption band of the component to be measured. The radiative relaxation mechanism of photons plays an important role for low gas pressures and high photon energies. The mid-infrared lasers are suitable for higher detection sensitivity. Another important application of PA spectroscopy is in aerosols research. The PA technique is the most suitable method for in-situ (filter free) precise and accurate measurement using the difference of light extinction and scattering.
Keywords: Extinction, scattering, aerosols

Effect of Plant Extract on Anti-bacterial Activity of Silver, Iron-Silver Bimetallic Nanoparticles

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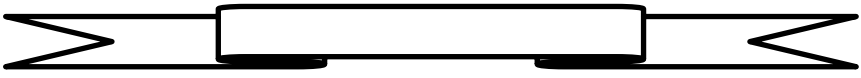
Abstract- Silver and iron-silver bimetallic nanoparticles are synthesized using citrus limon and azad irachtaindica leave extract through green synthesis methodology and the effect of these plant extract on the structural, morphological and optical properties and on antibacterial activity has been analyzed. The structural analysis was done using x-ray diffraction technique and it confirmed the formation of silver nanoparticles with fcc crystal structure. The presence of strong SPR peak in the UV-VIS spectrum confirmed the formation of silver and iron-silver bimetallic nanoparticles in the core-shell formation structure. The analysis of antibacterial activities suggested that azadirachtaindica leaves extract was a better reducing and capping agent for the reduction of silver ions and capping of silver and iron-silver bimetallic nanoparticles.
Keywords: Green synthesis, iron-silver bimetallic nanoparticles, citrus limon, azadirachtaindica, antibacterial activity



Surface Analysis of Ag-doped CdS thin films using XPS for Sustainable Energy

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Abstract- Cadmium sulfide (CdS) has been investigated extensively for n-type window layer in CdTe based solar cells. The significance of CdS is its tenability of energy band gap with n-type conductivity. The energy band gap engineering for tenability of their

optical properties can be controlled by doping, which showed a change in band gap of as-deposited CdS thin films after doping. For the use of window layer, primarily the band gap should be wider, less absorption losses, high conversion efficiency, stability and direct band gap transition type is required. Resistivity also effect the window layer of CdS so material should be low resistive. CdS was widely used in other applications like photo detectors due to its high photosensitivity, resistive switching and non-volatile memory. The synthesis techniques also play a vital role in the physical properties of CdS thin films. Many techniques have been well documented including vacuum thermal evaporation, chemical bath deposition, spray pyrolysis, chemical vapour deposition, metal organic, and closed space sublimation (CSS) technique. In all above techniques, CSS has an advantage to fabricate rough film for more trapping of light, efficient use of source material (about 20 mg) and a short distance between source and substrate. Ion exchange process is a doping process well documented in literature. As-deposited CdS thin films have high resistivity of the order of 10^6 Ω-cm, which can be reduced with the Ag-doping up to 10^2 Ω-cm. The silver (Ag) doping effects on the physical properties of CdS thin films were studied in this article. A comprehensive understanding is trying to establish after the Ag doping in CdS thin films to correlate the surface morphology with optical properties. The optimized Ag-doped CdS thin films samples will used instead of CdS as a window layer.

Keywords: CSS technique, Ag-doped CdS thin films, Optical properties

Spectroscopic Analysis of Plasma Liquid Interactions during Synthesis of Gold Nanoparticle

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Abstract- Different techniques like chemical methods such as Chemical reduction, biological methods and physical methods are usually used for the synthesis of nanoparticles. Chemical reduction method usually used toxic reducing agents which not only affect catalytic and sensing properties of nanoparticle but also limits their biomedical applications as well. Plants extractions and bacteria used in biological method as a reducing agents affect the purity of nanomaterials. Similarly, in physical methods, High speed and high temperature needed for the syntheses of nanoparticles affect purity of the as synthesized nanomaterial. To overcome these challenges, Plasma Liquid Interactions (PLIs) technique had been developed which avoid the use of reducing agents as plasma species play the roles of the reducing agents.

In the PLIs technique, the synthesis process is controlled by external parameters such as voltage, gas flow rates, separation between plasma electrodes, separation between plasma and liquid interface, etc. Another beauty of the PLIs technique is that the synthesis process can be stope at any stage during synthesis. With PLIs technique, one can synthesize surfactant free nanoparticles as well. To synthesize nanoparticles of the desired properties, one needs to optimized plasma parameters such as plasma temperatures and densities. For these purpose, we have characterized plasma parameters as a functions of discharge parameters during the plasma liquid interactions for the synthesis of gold nanoparticles. In this article, we have demonstrated, plasma parameters such as electron and ion temperatures, electron and ion densities as a function of discharged parameters such as applied voltage, discharge current, gas flow rates and plasma liquid interactions time.

***Keywords*:** Plasma Liquid Interactions, plasma density, Plasma temperature, Discharge current/Voltage, gas flow rate.

Exploratory and Computational Examination of the Impact of Cobalt Substitution on the Structural, Impedance, Electronic, Magnetic, and Optical Characteristics of Fe_2TiO_5 with Pseudobrookite Structure

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Abstract- We present a comprehensive investigation into the impact of Cobalt (Co) substitution for iron (Fe) within the pseudobrookite mineral Fe_2TiO_5, shedding light on alterations to its crystal structure, high-temperature electric permittivity, impedance, electronic properties, magnetic characteristics, and optical behaviors. This exploration combines both experimental and theoretical approaches. The pseudobrookite phase is distinguished by the presence of two distinct octahedral sites: Fe atoms occupy one type, while Ti resides in the other. The substitution of Fe with Co reveals the potential for substantial changes in one or more physical attributes, rendering the material more suitable for applications in solar energy technologies. In our experimental investigations, X-ray diffraction and high-temperature electric permittivity/impedance measurements were employed. We conducted tests within a temperature range of 20–300 °C and a frequency range spanning 100 Hz to 1 MHz. Through impedance analysis, we delved into various relaxation mechanisms, including those associated with grains, grain boundaries, and interfacial effects. To gain insight into the electronic structure, magnetic properties, and optical characteristics from a theoretical standpoint, we harnessed dispersion-corrected density functional theory (PBE-D2/U). The results indicate that the Co substitution of Fe in Fe_2TiO_5

has a modest impact on the material's structure and electric impedance properties. However, the electronic structure and magnetic properties exhibit significant changes, including a slight reduction in the bandgap and a decrease in the average magnetic moment per Fe ion upon Co substitution in Fe_2TiO_5.

Keywords: Magnetic properties, Electrical impedance, Density functional theory, optical properties.

Stable Piezoelectric Response for High-Temperature Piezoelectric Applications

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Abstract- Depolarization in the ceramic materials has remained the longstanding obstacle for the materials to be utilized in high-temperature piezoelectric devices. Herein, a strategy to defer thermal depolarization is employed. To acquire the best merits of two different materials, 0–3 type $CaBi_2Nb_2O_9$:*x*wt%$BiFeO_3$ (CBN:*x*wt%BFO) composites are engineered in a unique way by embedding the isolated BiFeO3 (BFO) grains at the grain boundaries of the $CaBi_2Nb_2O_9$ (CBN) matrix. The composite with 0–3 type connectivity ($CaBi_2Nb_2O_9$:40wt%$BiFeO_3$) exhibits a high density of 7.98 g/cm^3, a high saturated polarization of ~19 μC/cm^2, high resistivity of ~10^{10} Ω. cm, and an enhanced piezoelectric coefficient $d_{33}$of 29 pC/N at room temperature. Composite shows the sharp-peaked ferroelectric–paraelectric transition at high Curie temperature T_C of ~881°C. Importantly, the composite maintains a very high resistivity of ~10^5 Ω.cm even at 500°C and the $d_{33}$of 24 pC/N after annealing at 700°C. Moreover, the poled composite has displayed strong radial and thickness dielectric resonances at 20–

700°C. Concluding the results, the CBN:40 wt%BFO composite with 0–3 type connectivity shows the stable high-temperature piezoelectric response much better than either CBN or BFO and is the worthier candidate to be utilized in high-temperature piezoelectric devices.

Keywords: 0-3 type composites; $CaBi_2Nb_2O_9$; $BiFeO_3$; high-temperature piezoelectric, thermal stable

Solution Processed Exfoliation of 2D Materials for Electronic Devices

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Abstract- Graphene has been a wonderful material and explored for many applications over the years ever since its discovery in 2004. Our preferred route of exfoliation of graphene in large quantities without compromising quality is liquid phase exfoliation. The possible scalability of this route promises numerous opportunities towards application of graphene-based electrode in electronic devices. Here we discuss the liquid phase and electro-chemical exfoliation routes as strategies to acquire graphene and graphene-nanomaterial composites used as electrode for potential electronic devices.

Keywords: Exfoliation, Solution Processed, 2-D materials, Electronic Devices

Magnetic and Magneto-thermal Studies of Germanium Doped Gadolinium Silicide Nanoparticles for Hyperthermia Applications

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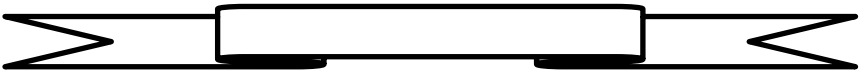
Abstract- In this paper magnetic and magnetothermal properties of germanium and rare-earth doped gadolinium silicide nanoparticles have been investigated with the objective of simultaneously attaining high heating and low Curie temperature (T_c) suitable for self-controlled hyperthermia applications (T_c ~ 315 – 320 K). Pellets of doped gadolinium silicide $Gd_5(Si_{1-x}Ge_x)_4$ and $(Gd_{1-xRx})_5Si_4$ with R = Ho, Nd and Er and $0 < x < 0.35$ were produced by arc melting and reduced to nanoparticulate form by surfactant assisted ball milling. Structural and morphological studies were done using X-ray diffraction and scanning electron microscopy (SEM) respectively. All samples show soft magnetic properties. The ferromagnetic to paramagnetic transition occurring at low fields makes them very attractive for biomedical applications, since it reduces remanence and coercivity to negligible values. Zero-field-cooled thermal demagnetization measurements showed that T_c of the nanoparticles can be lowered to lie within the limits required for self-controlled hyperthermia by varying the dopant concentration. Magnetic hyperthermia measurements on these nanoparticles show moderate values of the specific absorption rates (*SAR*'s) in applied *AC* magnetic fields of amplitude 10-15 Oe and frequencies of 327 kHz. The good heating response and reduced Curie temperatures of milled doped gadolinium silicide nanoparticles suggest their efficacy for self-controlled magnetic hyperthermia. Hemolysis studies on fresh human blood showed that oleic acid coated $Gd_5(Si_xGe_{1-x})_4$ nanoparticles had a much lower percentage of

hemolysis as compared to bare nanoparticles, suggesting possible biocompatibility of these materials.

Keywords: Magnetic hyperthermia, Nanoparticles, Specific Absorption rate, Self-controlled Magnetic hyperthermia



Increased Lithium-Iron Storage Capacity of Ferrite Nano-particles by Hybridization with Multi-walled Carbon Nanotubes

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Abstract- For high-performance lithium-ion batteries, the main features of the electrode materials aretheir wide surface area, rapid ion transport, and high electric conductivity. A two-step synthesis approach was used to synthesize the nanohybrids of multi-walled carbon nanotube and cobalt ferrite nanoparticles. The nanoparticles were initially prepared by the chemical coprecipitation method and then the CoFe2O4/(MWCNTs)x nanohybrids were assembled using ultra-sonication assisted route. Toluene was used as the dispersant for both the nanoparticles and MWCNTs. X ray diffraction was used to determine the predominant FCC crystal structure of these ferrites, and transmission electron microscopy was used to investigate the settlement of nanoparticles on thesurface of MWCNTs. The nanohybrids were subjected to an elemental composition investigation using energy-dispersive X-ray spectroscopy. In order to achieve high-performance lithium-ion batteries, MWCNTs provided effective electron transport channels in the nanohybrids through the embedment of nanoparticles on the surface of MWCNTs. These nanohybrids' electro-chemical analyses revealed a high specific capacity, excellent cyclic stability and a good reversible capacity.Thus, this practice is simple, inexpensive, and

highly efficient for fabricating high-performance anode materials for lithium-ion batteries.

Keywords: Anode materials, Lithium-ion battery, CoFe2O4/(MWCNTs)x nanohybrids, Toluene, Specific capacity, Cyclic stability, Rate capability.

Tailoring Zeolite-Composite (ZC) Impregnated Nonporous Membranes for Potential Gas Separation and Antibacterial Performances

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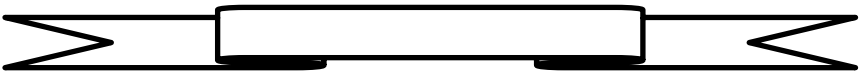
Abstract- Cellulose acetate (CA) composite membranes are tailored for potential gas-transportation and antibacterial activity by incorporating various ratios (0-8wt. %) of zeolite-CuO (10:1, ZC) composite. The aim behind this is to develop an anti-biofouling membrane with enhanced CO_2 permeation and selection properties. In situ co-precipitation route is adopted to synthesize ZC that imparted morphological, structural, thermal, and performance characteristics of membranes synthesized by solution casting mechanism. FESEM analysis revealed, pores size transformed from 1μm to 1.4 nm as observed in M0 (virgin) and M4 (8wt. % ZC) membranes, respectively. The existence and linkages of impregnated ZC in the developed membranes are verified by FTIR investigations. TGA-tested thermally endured membranes are tested for gas permeation/selectivity. In comparison to virgin CA membrane, three folds enhancements in CO_2 permeation and two folds in CO_2 /N_2 selectivity are observed. Membranes are also evaluated for antibacterial test against 'gram- negative bacteria'

elucidates that increasing ZC content in composite membranes exhibit remarkable results.

Keywords: Membranes, Zeolite, Gas separation, Anti-Bacterial, Cellulose Acetate



Loop Dynamics of a Fully Discrete Short Pulse Equation

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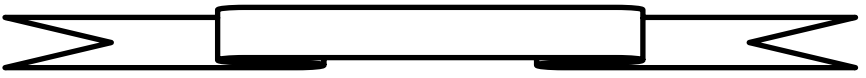
Abstract- Solutions are localised waves that can propagate over great distances; they constitute a form of lossless communication. Therefore, the production of solitons is of great importance in numerous scientific fields, including fluid dynamics, nonlinear optical fiber communication, plasma physics, the transmission of neuro-signals, and the transcription and replication of DNA. Solitons are the characteristic property of a class of differential equations that satisfy an integrability condition and are known as integrable systems. The propagation of optical signals with a width on the order of femtoseconds can be best described by the short pulse equation. The short pulse equation is a system that is integrable, and its integrability has been evaluated numerous times from a variety of perspectives.

The present study introduces a fully discrete short pulse (SP) equation, which arises from an integrability condition of a pair of difference equations known as the discrete Lax pair. Furthermore, two semi-discrete versions of the SP equation have been derived from the completely discrete SP equation through the use of continuum limits. The Darboux transformation is a widely recognised technique used for the computation of multisoliton solutions in the context of fully discrete and semi-discrete SP equations. The explicit expressions for the first and second

nontrivial soliton solutions are computed. An exact expression for the breather solution of the fully discrete SP equation is developed. This study investigates and demonstrates the dynamics of single-loop solitons as well as the interaction mechanisms between loop-loop and loop-antiloop solutions. In the context of the continuum limit, the outcomes derived are equivalent to previously established solutions for the continuous SP equation. This guarantees the novelty of the findings.

Keywords: Solutions, Darboux transformation, Integrability



Supersymmetric Hybrid Inflation in Grand Unified Theories (GUTs)

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Abstract- This research paper delves into the captivating realm where Supersymmetry (SUSY), Grand Unified Theories (GUTs), and inflation intertwine to unveil the early universe's profound mysteries. Our primary focus rests on the intriguing concept of supersymmetric hybrid inflation within the GUT framework. This theoretical framework exemplifies the elegance of unification, merging SUSY, GUTs, and inflation into an intricate tapestry of cosmic evolution. A scheme of simplified smooth hybrid inflation is realized in the framework of supersymmetric *SU* (5). The smooth model of hybrid inflation provides a natural solution to the monopole problem that appears in the breaking of *SU* (5) gauge symmetry. The supergravity corrections with nonminimalK¨ahler potential are shown to play an important role in realizing inflation with a red-tilted scalar spectral index n_s <1, within Planck's latest bounds. As compared to the shifted model of hybrid inflation, relatively large values of the tensor-to-scalar ratio *r*. 0.01 is achieved

here and the gauge symmetry-breaking scale $M' (2.0 - 16.7) \times 10^{16}$ GeV. In μ-hybrid inflation a nonzero inflation vacuum expectation value induced by supersymmetry breaking is proportional to the gravitino mass $m_{3/2}$, which can be exploited to resolve the minimal supersymmetric standard model μ problem. We show how this scenario can be successfully implemented with $m_{3/2} \sim 1 - 100$ TeV and reheat temperature as low as 10^6 GeV by employing a minimal renormalizable super potential coupled with a well defined non-minimal K¨ahler potential. The tensor-to-scalar ratio r, a canonical measure of primordial gravity waves in most cases, is less than or of the order of $10^{-6} - 10^{-3}$.

Keywords: Supersymmetry (SUSY), Grand Unified Theories (GUTs), Inflation, Hybrid Inflation**,** Gravitino Mass

2-D drift Solitary Structures in inhomogeneous Magnetized O-H ion Plasmas with Generalized (r,q) Distributed Electrons

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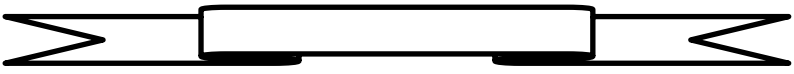
Abstract- The effect of generalized (r,q) distributed electrons on the linear and nonlinear coupling of drift and ion acoustic waves in a nonuniform plasma containing Hydrogen and Oxygen ions is investigated. In the linear regime, it is observed that increasing the percentage of flat-topped (i.e. $r>0$) electrons enhances the frequency of the coupled drift-ion acoustic waves whereas the increasing values of the spectral index q mitigates it. In the nonlinear regime,

one and two dimensional KdV-like and KP-like equations are derived and their solutions are plotted for different ratios of ion number densities and for different values of double spectral indices *r* and *q* of the generalized distribution of electrons. It is found that only rarefactive structures exist for two dimensional solitons, however, both rarefactive and compressive structures are observed for the one-dimensional case. The limiting cases of kappa and Maxwellian distributions are also discussed and their comparison with the generalized (*r*,*q*) distribution is thoroughly investigated.

Keywords*:* Drift waves, Solitons, Generalized (*r*, *q*) distribution.



Experimental and Numerical Investigations on Feasibility of Inorganic $KSnCl_3$ Perovskite Absorber and SWCNT-HTL for Solar Cells

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Abstract: Inorganic metal halide perovskite materials have attracted remarkable attention as light harvesters because of their promising optoelectronic merits and photovoltaic features like tunable band gaps, high charge carrier mobilities and greater absorption coefficients. In order to explore new inorganic perovskite materials for use in optoelectronic devices Potassium Tin Chloride ($KSnCl_3$) has been experimentally synthesized using a supersaturated recrystallization technique at ambient conditions. The resultant nanoparticle (NP) samples were characterized for structural and optical properties by X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray

Spectroscopy (EDX) and Ultraviolet (UV) visible spectroscopy techniques. Experimental investigations about structure reveals that $KSnCl_3$ crystallizes in orthorhombic phase with particle size of 400-500nm. SEM showed better crystallization and EDX confirmed the accurate structural composition. UV-Visible spectroscopic analysis showed a strong absorption peak at 504nm, and the band gap is 2.70 eV. Theoretical investigations of $KSnCl_3$ were also carried out via AB-initio calculations in Wein2k simulation program using generalized gradient approximation (GGA) and modified Becke Johnson (mBJ) approximation. Optical properties like real and imaginary part of dielectric constant (ε_1, ε_2), refractive index n (ω), extension coefficient k (ω), reflectivity R (ω), absorption coefficient α (ω) and optical conductivity L (ω) were examined, and it was observed that theoretical investigations were consistent with experimental findings. Incorporation of $KSnCl_3$ as an absorber materialalong with single walled carbon nanotubes as p-type materials in (AZO/IGZO/$KSnCl_3$/CIGS/SWCNT/Au) solar cell configuration have been investigated by SCAPS-1D simulation package. Remarkable power conversion efficiency (PCE) of 36.823% with open circuit voltage (V_{oc}) of 0.9914 volts and short circuit current density (J_{sc}) of 47.32067 mA/cm^2 has been predicted. Thermally stable $KSnCl_3$ may become potential source in manufacturing of photovoltaic and optoelectronic applications on large scale.

Keywords: Optoelectronic; Nanotubes; Electrical; Optical; Photovoltaic

Pseudo-smooth Tribrid Inflation in SU (5)

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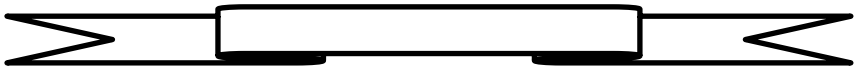
Abstract- A realistic tribrid model of sneutrino inflation is constructed in an *R*-symmetric *SU* (5) grand unified theory (GUT). To avoid the monopole problem, a pseudosmooth inflationary trajectory is generated with the help of an additional Z_5 symmetry which is broken during and after inflation. The predictions of inflationary parametersare made at the central value of the scalar spectral index, n_s= 0.968. The largest possible value of the tensortoscalar ratio, $r \lesssim 0.0027$, is obtained with sub-Planckian field values ($\lesssim m_P$). A successful realization of re-heating and leptogenesis is achieved by avoiding the gravitino problem with a reheat temperature as low as 10^6 GeV. The predicted range of the gauge symmetry breaking scale, $5\times10^{16} \lesssim M/\text{GeV} \lesssim 5\times10^{17}$, turns out to be somewhat larger than the typical GUT scale. With additional vector- like families, a successful gauge coupling unification is achieved by avoiding the no-go theorem related to *R*-symmetric *SU* (5) GUT.

Key Words: sneutrino inflation, *R*-symmetric, pseudo-smooth



STATISTICS

Spatial Analysis of Water Quality Index Using Principal Component Weight Index and Multivariate Analysis

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Abstract- Bad quality of water is one of the key elements affecting human health globally. Sluggish decision-making and poor judgment are delaying the improvement of groundwater quality, which could lead to several health issues. To demonstrate the status of water quality, Water Quality Index (WQI) integrated from Principal Component Analysis (PCA)-PCWQI to communicate the quality of water of ten cities of Punjab including Islamabad, Faisalabad, Rawalpindi, Gujrat, Gujranwala, Lahore, Kasur, Sargodha, Sheikhupura and Sialkot. Each water sample is analyzed by using nine different physio-chemical characteristics as pH, Total Dissolve Solids (TDS), Turbidity, Hardness, Chlorine (Cl), Nitrate (No_3), Iron (Fe), Fluoride (F), AS. Further, clustering with different weight methods and multinomial logistic regression are applied to classify water quality data and classes are compared with PCWQI. From results, it is found that spatial water quality data have different in nature from each other. Moreover, it is suggested that before consumption of water, proper treatment of water is required to avoid health risks.

Keywords: Water Quality Index (WQI), Principal Component Analysis (PCA), Multinomial

ON The Improvement of Estimator(s) Using Fuzzy Approach under Simple Random Sampling Scheme

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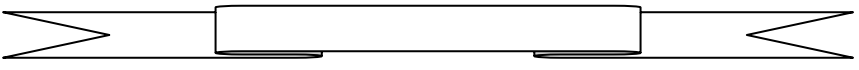
Abstract- In this study ratio and product-type estimators have been proposed for estimating the population mean, using the information of auxiliary variable considered as a triangular fuzzy numbers, under sampling design such as simple random sampling. For each proposed estimator expression of bias and mean square error of order one has been derived. Mathematical comparison has been furnished of the proposed estimators with the existing estimators. It is experiential that the proposed estimators are more efficient than existing estimators given in literature. To study the properties of the estimators, it is clear that the proposed estimators are consistent estimators of population mean.

Keywords: Triangular fuzzy numbers, Estimators, Ratio & Product type estimators, MSE



Robust Moving Average Control Chart for Dispersion Parameter

Muzzamil Hussain[1*], Noureen Akhtar[1], Muhammad Wasim Amir[1], & Syed Muhammad Shoaib Hassan[1]

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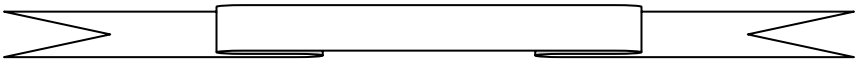
Abstract- Statistical quality control deals with controlling, monitoring, and improving the output of the production and manufacturing processes to enhance the quality of their products and services. Control charts are the major tools that are widely applied in industry to keep the process variability under control. Generally,

control charts work under the assumption of normality but in real life, a lot of industrial processes do not follow the normal distribution. The present study is concerned with proposing different robust dispersion control charts under normal and non-normal environments using a moving average (MA) structure. Moreover, a variety of robust and non-robust dispersion estimators are also considered in this study. The performance of the proposed structures is evaluated using average run length (ARL) and standard deviation of run length (SDRL). The Monte Carlo simulation method is adopted to evaluate the properties of run length distribution for the proposed structures. An illustrative application is also provided to support the numerical results.

Keywords: ARL, Process Dispersion, Robust Estimators, Moving Average Control Chart



A Comparative Analysis of Randomized Response Models for Quantitative Data

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Abstract- In social and behavioral surveys, generally the research questions are interrelated to personal life of respondents, and the respondent typically answering the stigmatize questions unfaithfully in the desire of leaving good impression on the interviewer. The randomized response technique (RRT) is a useful tool to collect reliable data and also overcome social desirability bias, when the asked question is sensitive. Many variants of quantitative randomized response models have been developed by researchers and these models are used in surveys to attain accurate estimates. In this study, a mixed quantitative randomized response model has been proposed for estimating the population mean of a sensitive variable in presence of scrambled response under simple random

sampling. The properties of proposed model are described and verified its theoretical results with empirical analysis. An impartial comparison of proposed mixed quantitative randomized response model with some existing additive, multiplicative and mixed quantitative models are made. The model efficiency and privacy are considered in comparison, also the joint effect of both model efficiency and privacy are calculated. The finding suggests that proposed RRT model perform better than some existing model in term of efficiency but may perform worse in account of privacy.

Keywords: Scrambled response; Sensitive variable; Simulation; Efficiency comparison; Privacy Protection

Forecasting of Life Expectancy Rate at Birth in Some SAARC Countries

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Abstract- Life expectancy is a general measure for health of population. It implies that how many years an individual is expected to live based on its birth years. Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth remained the same throughout his life. The study is carried out for the comparison and forecasting of life expectancy at birth in some SAARC countries because health conditions are almost same in these countries. Data set of 42 years from 1980 to 2021 taken by the World Bank. ARIMA model is seemed to be the best fitted model for forecasting the LEB. Different time series models are applied to find the best fitted model for each series. The performance of models are evaluated on the basis of root mean square error, mean absolute error, mean error, mean absolute percentage error, mean percentage error, Akaike information criterion and Schwarz information criteria. Additionally, different tests are used to satisfy the assumption of randomness and normality

of residuals. Life expectancy at birth for next some years have forecasted.

Keywords: ARIMA, life expectancy, AIC

On Proper Choice of Location Control Charts under Ranked Set Sampling

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Abstract- Statistical control charts play a vital role in the manufacturing and service industry to monitor, control, and improve the output of the process. Generally, the structure of the control charts is based on the assumption that the underlying quality characteristic follows the normal distribution. Commonly, in a practical environment, a lot of processes do not follow the normal distribution. This study is designed to monitor the location parameters under normal and several non-normal environments using ranked set sampling (RSS). Both skewed and heavy-tailed symmetric distributions have been considered in this study. Furthermore, different location estimators such as mid-range, trimean, Hodges-Lemann, median, and sample mean are also used for the proper choice of monitoring of location parameter. The performance of the proposed control charts is assessed using average run length (ARL). An example related to industrial processes is also provided to show the implementation of proposed designs. This study is aimed to support the quality experts and practitioners in choosing the proper control chart for location parameters under normal and non-normal environments for RSS.

Keywords: ARL, RSS, Location estimators, non-normal environment

Apple Production of Pakistan: A Time Series Modeling and Forecasting

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Abstract- Apple is an important fruit due to its popularity because it contains fiber, calories, Vitamin C, and multivitamins which are beneficial for human health. The demand for apples is increasing due to an increase in the population of a country. Therefore, it is imperative to forecast apple production to observe the current status and to estimate the future trends of a country. This study is concerned with forecasting the apple production of Pakistan. For this purpose, various time series models are fitted on the historical time series data (1958-2019) and search for the best model based on model selection criteria. It is observed that the Autoregressive Integrated Moving Average (2, 1, 2) model is a suitable time series model for forecasting the apple production of Pakistan. The assumptions of the selected model are also evaluated. On the basis of the ARIMA (2, 1, 2) model, we observed that apple production of Pakistan is forecasted to be 697.651 thousand tons in 2030 under the assumption that there is no irregular pattern occurred.

Keywords: Average run length, location, non- normal, ranked set sampling

Forecasting Analysis of Drought Hazards through Automatic Time Series Analysis

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Abstract- Climate change due to global warming has increased the risk of regular drought hazards. For the purpose of predicting drought hazard this study uses automatic time series analysis (ATA) method. In the natural climate cycle, a drought refers to an extended period of arid conditions that can have significant repercussions on global climate patterns. Automatic time series analysis (ATA) is a process that uses statistical and machine learning algorithms to automatically analyse time-series data. In this study, the ATA method is applied to Standardized Precipitation Index (SPI) data. SPI is a commonly used drought index that standardizes precipitation data to assess deviations from normal conditions. This methodology is applied on SPI data of different metrological stations of Punjab province (Cluster 1) and Sindh province (Cluster 2). Different time scales of SPI are utilized in this analysis. SPI can be calculated over various time intervals to capture different aspects of drought, such as short-term versus long-term drought conditions. Here, seven time scales of SPI are used i.e, 1, 3, 6, 9, 12, 24 and 48. The study employs several evaluation metrics to assess the accuracy of the forecasting model. These accuracy measures include Mean Square Error (MSE), Relative Mean Square Error (RMSE), Mean Average Error (MAE), Mean Percentage Error (MPE), and Mean Average Percentage Error (MAPE). These metrics help determine which time scale of SPI provides the best results for different meteorological stations. The proposed framework is designed to forecast drought conditions for upcoming years. This suggests that the study aims to provide valuable information for planning and preparedness in the face of potential drought events. From cluster 1 and cluster 2 the performance of SPI 48 month time scales is the better than other time scales. It is analyzed that our purposed frame work is better and gives satisfactory results in matter of forecasting the drought for upcoming years. Overall, the study appears to be a valuable contribution to understanding and mitigating the impact of droughts in the context of climate change.

Keywords: Climate cycle, Automatic, Time series analysis, Standardized Precipitation Index, Time Scales

Efficient Classes of Estimators of Population Variance in Two-Phase Successive Sampling under Random Non-Response

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Abstract- This paper presents some efficient classes of estimators of population variance in two-phase successive sampling under random non-response. The suggested classes of estimators are for simple random sampling and for different situations of non-response. Up to first-order approximation MSE's of suggested classes of estimators are derived. The efficiency of the presented estimators is contrasted with the estimators for the complete response scenarios. Usefulness of the presented classes of estimators is checked. To test the efficiency real data sets are used. The proposed classes of estimators are more efficient. Results are interpreted.

Keywords: Successive Sampling; Auxiliary variable; Random non-response; Variance estimator; Bias; Mean square error

Dual Use of Study Variable: A Novel Approach to Estimate the Finite Population Mean

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Abstract: In this article, a novel concept of dual use of information of study variable is suggested which requires no extra cost and time. Along with magnitudes of observations in the sample, ranks are utilized to formulate a more efficient estimator of the finite population mean. Expressions for Mean Square Error (MSE) and bias have been reported up to first order of approximation. The newly recommended estimator is then compared, both theoretically and numerically, with the usual mean estimator, $\bar{y}$, and the well-known Searls' estimator through MSE and Percentage Relative Efficiency (PRE) criteria. It is exciting to note that the proposed estimator has lower MSE and higher PRE in comparison to its oppositions. The theoretical as well as the numerical results acknowledge the efficient performance of the newly proposed simple and novel estimation approach.

Keywords: Bias, Mean squared error, Ranks of study variable, Percentage relative efficiency, Mean estimator

A New Randomized Response Model for Simultaneous Estimation of Mean of Two Sensitive Variables

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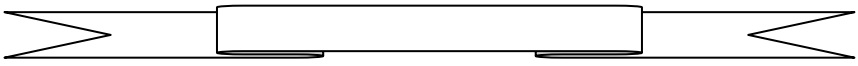
Abstract- The objective of our study is to estimate the mean of the two quantitative sensitive variables. We proposed a new randomized response device in simple random sampling for estimating the mean

of two quantitative sensitive variables using the highly correlated scrambling variables. The mean and the variance expressions are obtained by using the randomized response technique. Collection of primary data is also discussed. It has been shown through real and simulation study that the proposed estimators are more efficient than the competent estimators.

Keywords: Estimation characteristics, randomized response technique, simple random sampling, relative efficiency



Economic Growth Dynamics: Exploring the Role of Manufacturing, Trade, and Youth Employment in Lower Middle-Income and Highly Indebted Countries

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Abstract- The relationship between manufacturing, trade, and youth unemployment is examined in this study. An attempt has been made to find their effect(s) on short and long -term economic growth in various countries. Longitudinal data for 30 years (1992 to 2021) from 20 lower middle income & heavily indebted poor nations, including both Muslim and non-Muslim countries, including both Muslim and non-Muslim countries, is considered for this study. Panel ARDL technique is implemented to check the associations between economic growth, manufacturing, trade and youth unemployment. The findings indicate that in lower-middle-income countries, manufacturing and trade contribute to economic growth, whereas youth unemployment has a negative influence. Manufacturing is an important component of economic growth in highly indebted poor countries, although trade appears to have little effect on the economy. The study further emphasizes on the effect of youth unemployment on economic growth, which is consistent

with World Bank data from 2021 showing that young entrepreneurs and the labour force can promote economic expansion in developing nations. The Dumitrescu and Hurlin heterogeneous causality test results reveal bidirectional causation between manufacturing and economic growth and trade and economic growth, demonstrating mutually reinforcing interactions. To improve economic growth and create jobs for citizens in these countries, officials should focus on policies that support manufacturing and commerce, as well as policies that reduce youth unemployment.

Keywords: Economic Growth, Manufacturing, Trade, Youth unemployment, Panel ARDL

A Comparison between Exponential Smoothing and Fuzzy Neural Network Techniques in Time Series Forecasting

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Abstract- Yield generation zone has great significance in Agriculture sector of any country. The aim of this research was to predict the production of Rice in Pakistan, based upon previous twenty-five years data from 1995-2019. Two different techniques have been used for the sake of prediction. In this study Exponential smoothing forecasting technique Holt's Exponential smoothing, and Fuzzy neural network techniques have been applied on the historical data. An Algorithm of Fuzzy hesitant aggregation has been developed and applied in the neural network activation function. Holt's exponential smoothing forecasting type has been applied, and forecasted results of both Fuzzy neural and exponential smoothing techniques have been compared through different performance base measures such as (MAE) Mean Absolute Error and (RMSE) Root mean square error.

Keywords: Networking, Holt's Exponential, Smoothing, Time series Forecasting, Hesitant Aggregation

Identification of Different Diseases in Medical Sciences by Using The Stochastic Diffusion Model

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Abstract-This research, identifies diseases using the stochastic different model and also estimate the parameters of the newly model. We have developed the Cox Ingersoll with stochastic diffusion model in the presence of jumps. The mains purpose of this research is to identify the real-life application model in the field of medical sciences. We estimate the Cox Ingersoll with stochastic diffusion model and derived the drift and volatility to identify the different diseases in human being a real data which tell us whether the jumps arrive in the data of different seasonal diseases or not.

Keywords: Diffusion, Stochastic process, Time Series Forecasting, Drift, Volatility

Ensuring Quality Service in Emergency Response: A Control Chart Approach for Rescue 1122

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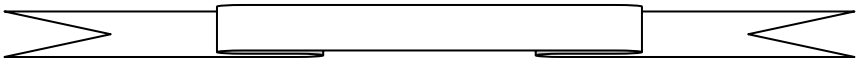
Abstract-Rescue 1122, as an integral part of emergency response systems, plays a critical role in saving lives and mitigating crises. The quality of service provided by Rescue 1122 is paramount in ensuring efficient and effective emergency response. This study

related to the application of control charts in monitoring and improving the quality of service offered by Rescue 1122. Control charts are statistical tools that help organizations monitor and maintain the stability and consistency of processes. In the context of Rescue 1122, control charts can be used to track key performance indicators (KPIs) such as response times, dispatch accuracy, and resource allocation efficiency. By collecting real-time data and analyzing it using control charts, Rescue 1122 can identify variations and trends in their service delivery. In the current study, we implemented the control chart on real data set taken from rescue Sargodha.

Keywords: 1122, control chart, real-data, attributed control charts, variable control charts



Modeling of Bivariate Discrete Dependent Extremes

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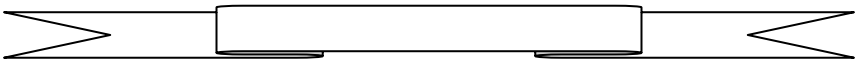
Abstract- This study presents a new model for describing dependence in discrete exceedances over a threshold. The modeling framework is executed in two steps. In the first step, discrete exceedances are modeled through a discrete generalized Pareto distribution, which can be obtained by mixing a Geometric random variable with a Gamma distribution. In the second step, a model for extreme values is built by injecting variables with Gamma marginals via a hierarchical framework, which confirms that the marginal distribution is a discrete generalized Pareto distribution, as expected from classical discrete extreme value theory. We employ different hierarchical paradigms with Gamma marginals, each producing a different dependency structure, either asymptotic independence or

asymptotic dependence. The proposed model is applied to bivariate avalanches data of the French Alps. Observations over a finite threshold have shown asymptotic independent behavior. One can also use a new model for the discrete data, which has asymptotic-dependent behavior over the tail. In both scenarios, the proposed model is flexible.

Keywords: Generalized Pareto distribution, dependence modeling, hierarchical modeling



Association between Celebrity Adoration and Self Esteem: A Study of K-Pop Undergraduate Female Fans

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Abstract- K-pop groups have gained significant popularity worldwide, and they often have a large fan following, particularly among young girls. K-pop groups typically consist of several members who are well trained in singing and dancing. The present study aimed to examine the association between celebrity adoration and self-esteem among female undergraduate students who idolize K-pop. The study also focuses on the effects of celebrity adoration on the academic performance of K-pop fans. For this purpose a sample of 161 female students aged between 17 and 25 filled out the Rosenberg Self-Esteem Scale (RSES) and Celebrity Attitude Scale (CAS) along with some other added questions. Results showed that there was insignificant negative correlation between celebrity adoration and self-esteem for the undergraduate females who adore K-pop. This adoration lead to negative and significant effect on their academic performance. Reasons for liking the K-pop group was that they are multi-talented and it give them joy when they listen to their music. The most used social media to access information about K-pop was instagram. Despite their adoration they don't spend much

on buying Albums or trying to become like them. Spending on music album has also strong association with the socio economic status of the participants. Study further reveals that age and celebrity adoration have negative association; as the age increases celebrity adoration decreases.

Keywords: Celebrity adoration, Celebrity Worship, Self Esteem, Undergraduate Students, K-Pop

Estimation of Poverty Bounds for Pakistan using Synthetic Panel Data

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Abstract- Poverty is a big threat to prosperity in developing countries like Pakistan. Alleviating poverty needs concerted efforts including how to measure and analyze poverty. Therefore, this paper employs synthetic panel technique and uses repeated cross-sections household survey dataset (Household Integrated and Economic Survey (HIES)) of Pakistan for 2010–11 and 2015–16, to derive poverty bounds for Pakistan. The findings of the paper suggest that 17% of population still remains in poverty in 2015–16 as they were in 2010–11. They don't move in or out of poverty. In the same periods 19% population affected by poverty. The 2.5% poor's of 2010–11 moves out of poverty in 2015–16. This constitutes the first

attempt to provide an insight into poverty dynamics in Pakistan using the available survey data.

Keywords: Poverty, Synthetic Data, Pakistan, Household, Repeated Cross-Sections, Pseudo Panel

Prevalence of Test Anxiety and Academic Performance among Undergraduate Students

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Abstract- Worldwide studies show that students exhibit high level of anxiety when confronted with test. Test anxiety is a common problem characterized by extreme anxiety, worry, and nervousness experienced during exams. This study explores the prevalence and severity of test anxiety among undergraduate students and its impact on academic performance. The sample consists of 150 students from five different universities of Islamabad, Pakistan. The Test Anxiety Inventory questionnaire was used to collect data, measuring test anxiety across three subscales: Test Anxiety-Total, Test Anxiety-Worry, and Test Anxiety-Emotionality. The findings revealed that students generally exhibit a moderate level of exam anxiety, and this anxiety adversely affects their academic performance. Moreover, the study indicates that there is a difference in the level of exam anxiety between male and female students. Male students showed high anxiety and poor academic performance as compared to female students. It was observed that students who had friendly relation with their parents have high test anxiety score. Further study also explored that students with low socioeconomic background have high anxiety as compared to the students with high background.

Keywords: test anxiety; under graduate students; Academic performance.

A comparison of Different Fertility Models for South Asia

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Abstract- This article aims to estimate and compare fertility patterns across South Asian nations using various mathematical models. Fertility analysis is crucial for understanding population growth, and accurate modelling of fertility patterns can provide valuable insight for policy making. In this study eight commonly used parametric and non-parametric models were fitted to age specific fertility rate (ASFR) data from eight South Asian countries using the non-linear least square approach. The performance of these models was assessed using Akaike information criterion (AIC) and residual sum of squares. The results show that different models perform better for different countries, indicating the absence of a universal model for representing fertility trends in all South Asian regions. The Peristera and Kostaki model generally provided the best fit for most countries, while the Gompertz model showed good performance in Bhutan and Nepal. However, it is important to note that no single model emerged as the ideal choice for capturing the fertility patterns of all South Asian nations. These findings underscore the need for tailored and flexible models to accurately represent the unique fertility patterns observed in different regions.

Keywords: Age specific fertility rate (ASFR), parametric, non-parametic fertility models, Non-linear least square estimation (NLS), Akaike information criterion (AIC)

Estimation of Unemployment Duration among Graduates (2015-2020) using Survival Analysis

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Abstract- Unemployment is the core issue in the development of any country's economy and Pakistan is no exception to it. It not only create negative impact of country, but also contribute to social unrest, poverty and crimes in the State. The basic aim of this research is to estimate duration between graduation and being employed. For this purpose, the data was collected from 190 participants in which 143 were employed and 47 were still in the unemployment phase. The study examines the length of unemployment using the survival analysis methodology. The total duration of the study is 72 months in which Kaplan Meier estimates suggest average survival time of unemployment as 34 months. Cox proportional model revealed that graduates parents alive status, family type, no of siblings and nature of employment were significant factors contributing to the hazard of unemployment. It was also observed that male graduates got early employment as compared to female graduates. Married persons and respondents from joint family got early employment as compared to those who are were unmarried and belong to nuclear family respectively.

Keywords: Unemployment, survival data analysis, Kaplan Meir, graduates, Cox Proportional Model.

Survival Analysis of Infants in Small Areas Using some Indirect Methods

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Abstract-To ensure the well-being of the masses in a country, policymakers need a clear picture of health indicators at a more granular level. They need to know how to overcome mortality problems related to infants after their birth in the country. This can be done by estimating health outcomes at a small level using data from health surveys and combining them with administrative records. The study's main objective is to suggest some improved estimators of survival function in small areas using direct estimators of survival function, indirect estimators of survival function, synthetic estimators of survival function, composite estimators of survival function, and ratio estimators of survival function, and to obtain separate estimation methods for infant mortality in different sub-populations according to demographic sub-populations demographic characteristics. This study will adopt indirect such as the synthetic estimation method, composite estimation method, and Time-Space Nearest Neighborhood Estimation method to obtain indirect estimates for infant mortality. This study will help public health policymakers make policies for small areas where the required data is limited. Whoever is working on the infant mortality rate, be it the government or NGOs, and may get a clearer picture of the mortality rate of infants using the adopted method.

Keywords: Indicator function, Infant mortality, Granular level, Survival, Time-Space Nearest Neighborhood

ZOOLOGY

Evaluation of Antifungal Activities of Different Fractions of *Monotheca buxifolia*.

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Abstract-Antimicrobial research is required for the discovery and growth of new therapeutic antimicrobial agents. This effort is encouraged due to lack of good antifungal agents and the ongoing trouble of development of resistance to existing antimicrobial agents. *Monothecabuxifolia* (Falc.) A. DC. is a medicinally important plant. It belongs to the family Sapotaceae. In folk medicine, it is used as vermicidal, laxative, antipyretic, hematinic, and to treat gastro-urinary disorders. In this study, the antifungal potentials of various fractions derived from crude methanolic extract of *M. buxifolia* were determined using tube dilution method. *M. buxifolia* crude methanolic extract was further partitioned into n-hexane, ethyl acetate, chloroform, butanol and aqueous fractions. The anti-fungal efficacy of these extracts was evaluated against four fungal strains.Highest inhibition in growth of *Aspergillus fumigates* was recorded for butanol fraction (41.66%) followed by methanol (20%) and chloroform (10%).The *n*-butanol fraction showed 44.44% inhibition against *Fusariumsolani*, while the rest of the fractions showed the inhibition in the following order: n-hexane (30%), methanol(27.77%) and ethyl acetate (27.77%).Low activity was shown by butanol (17.39%), ethyl acetate (15.78%), aqueous (13.63%) and n-hexane (11.11%) against *Mucor pyriformis*whereas rests of the fractions were unable to produce any inhibition in fungal growth. Butanol fraction showed 75% inhibition against *Aspergillus flavus* followed by ethyl acetate (36.84%) and methanol (17.64%). These results indicate the anti-fungal potential of *M. buxifolia*which

can be utilized for isolation and characterization of anti-fungal compounds for drug formulation.

Keywords: Monothecabuxifolia, Anti-fungal, Sapotaceae, Antipyretic, Aspergillus fumigates

New Records of *Anthaxia* Eschscholtz, 1829 (Coleptera: Buprestidae: Anthaxiini) from Pakistan

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Abstract-Five species of *Anthaxia* Eschscholtz, 1829 recorded first time for the country. These are *Anthaxia (Anthaxias.str) anatolica* Chevrolat; *Anthaxia (Melanthaxia) hemichrysis* Abeille de Perrin; *Anthaxia (Haplanthaxia) gedrosiana*Bily; *Anthaxia (Melanthaxia) conradti* Semenov and *Anthaxia (Melanthaxia) tianshanica*, Bily The detail morphology, illustration of genitalia, significance and close allies also provided.

Keywords*:*Buprestidae, Anthaxia, new records, taxonomy, Pakistan

Journey towards Personalized Medicines and Rare Genetic Diseases Management

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Abstract-This omics approach is particularly helpful since it identifies biomarkers of disease progression and treatment progress by collective characterization and quantification of pools of biological molecules within and among the various types of cells to

better understand and categorize the Mendelian and non- Mendelian forms of rare diseases. Multiomics also described as integrative omics is an analysis approach that combines data from multiple 'omics' approaches including genomics, transcriptomics, proteomics, metabolomics, epigenomics, metagenomics and metatranscriptomics to answer the complex biological processes involved in rare genetic disorders. A range of omics software's used for multiomics data exploration and integration in rare disease analysis. Recent advances in the field of genetics and translational research has opened new treatment avenues for the patients. The innovation in the next generation sequencing and RNA sequencing has improved the ability from diagnostics to detection of molecular alterations like gene mutations in specific disease type. The thorough understanding of rare genetic disorders and its treatment at molecular level led to the concept of personalized medicines approach, which is one of the most significant advancements in modern research which enable researchers to better comprehend the flow of knowledge which underpins genetic disease.

Keywords: Genetic diseases, multiomics, personalized drugs, drug resistance, next generation sequencing

Navigating the Challenges of DNA Extraction from Soil-Soaked Blood Samples in Forensic Analysis

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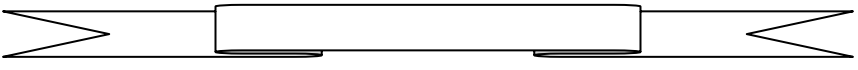
Abstract-Extraction of DNA from challenging soil-soaked samples, predominantly containing blood for forensic DNA analysis, is a formidable endeavor in molecular biology and forensic science.

These samples are notorious for their highly degraded and inhibitory DNA, necessitating a specialized approach. Drawing upon a decade of professional academic writing experience, this Abstract- delves into the intricacies of this process, emphasizing the pivotal role of Low Copy Number (LCN) PCR techniques. Beginning with meticulous sample collection techniques to minimize contamination and preserve DNA integrity, the focus shifts to the distinctive challenges posed by soil-soaked blood specimens. These challenges arise from the combined effects of soil degradation and the presence of PCR inhibitors. LCN PCR emerges as the cornerstone of this analysis, leveraging its capacity to amplify minute quantities of severely degraded DNA, a common characteristic of soil-soaked blood samples. Its proficiency in amplifying short DNA fragments, often the sole surviving genetic material in such samples, positions LCN PCR as an indispensable tool in forensic DNA analysis. Optimization strategies are paramount, encompassing controls, primer design tailored for short target sequences, and dilution protocols to counteract PCR inhibitors. The selection of specialized DNA polymerases, known for their resilience in the presence of soil-derived inhibitors, further augments the reliability of analysis. In conclusion, the extraction and analysis of DNA from soil-soaked blood-containing samples for forensic applications demand a unique and well-honed skill set. This contribution significantly advances the field of forensic DNA analysis, particularly in challenging scenarios.

Keywords :DNA Extraction, Blood Samples, Forensic Analysis, Soil-soaked samples, Low Copy Number



Exploration of Spatial Variations and Correlations in Commercially Important Shrimp's Morphometric Traits

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Abstract-Shrimps are considered as white gold and contribute to the economy of the country in many regions of the world. This study investigated the correlation among some morphometric trait total length (TL), total weight (TW), and condition factor (CF) across various locations (Korangi fish harbor, Karachi Fish harbor, Ketibunder, and Sonmiani) in Pakistan, with a particular focus on six shrimp species belongs to four (*Metapenaeus*, *Penaeus*, *Fenneropenaeus*and*Parapeneopsis*) genera. A significant difference was observed among these species, when examining Total length values across different sites, *F. merguiensis* had the highest mean TL value (15.53±2.29), from Karachi fish harbor followed by *P. monodon* (12.73±4.65), *F. penicillatus* (12.29±2.50), *F. indicus* (12.19±2.34), *M. affinis* (11.64±3.75), and *Pp. stylifera* (10.20±2.082). Notably, Total weight showed substantial variation among species, with *F. penicillatus* having the highest mean TW value (32.2±10.3 g), with the lowest *Pp. stylifera* (4.4±2.6 g). When considering measurements across different sites, the highest CF mean value was found in *P. monodon* (0.65±0.20), followed by *M. affinis*(0.63±0.24), *Pp. stylifera* (0.61±0.35), *F. merguiensis* (0.55±0.1798), *F. indicus* (0.54±0.16), and *F. penicillatus* (0.54±0.15). The study also revealed the significant distinctions for the TL, TW, and CF for *M. affinis* (P=0.000; DF=3; F=11.70), *F. indicus* (P=0.000; DF=3; F=49.79), and *P. stylifera* (P=0.000; DF=2; F=43.00) among the sites. These findings provide valuable insights into the variability of these parameters across shrimp species with reference to locations, which can be instrumental in understanding the ecological dynamics and different stages of life cycle of shrimp populations and interaction with their habitats.

Keywords: Shrimps, Penaeid, Morphometry, Spatial, Pakistan

Shell Morphometry of Giant and Titan Barnacle Species *Megabalanustintinabulum* and a New Report: *Megabalanuscoccopoma* from Rocky Shore of Karachi,Pakistan

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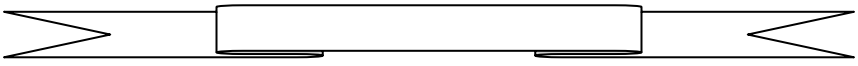
Abstract-This is the first time the species, *Megabalanuscoccopoma* has been reported from Pakistan coast often known as titan acorn barnacles, and a representative of the family Balanidae. As previously, there's no record of *Megabalanus coccopoma* from the rocky shore of Karachi Pakistan and the present study provides the proof for the presence and extension of *Megabalanuscoccopoma* from rocky shore of Pakistan. *Megabalanuscoccopoma*, often known as the titan acorn barnacle, is an opportunistic species that lives on ship hulls and other hard surfaces. While *Megabalanustintinnabulum* is the type species belongs to the same genus. *M. tintinnabulum* is thought to have originated in the tropics, possibly in West Africa and the Indo-Pacific. Morphometrical relationship in the barnacle species *Megabalanuscoccopoma*and*Megabalanustintinabulum*has been studied in relation to variation in adult shell form that includes differences among species and size-related changes in shape. The present study was designed to identify morphometric relationship of both species and to quantify traits of evolutionary significance by detecting changes in shape and function or evolutionary relationship. During current study, specimens of both species collected from intertidal zone of Manora rocky shore during October

to November 2021. The titan acorn barnacle basal diameter ranged from (23-45mm) whereas *M. tintinnabulum* is a large barnacle, up to 50mm tall and (31-51mm) in diameter. The following measurements of the shell were taken on each individual: the length of the basis along the carinorostral axis (LBA), the width of the basis (WBA), the length of the orifice along the carinorostral axis (LOR), the width of the orifice (WOR), the height of the carina (HTC), the height of the rostrum (HTR), the average thickness of the shell wall (TKC). The derived morphometric measurements revealed the significant differentiation and accurate measurements between species by using allometric and statistical data.

Keywords: Barnacle, Morphometry, Coccopoma, TintinabulumManora, Pakistan, Mollusca shell



Fiddler Crab *Ucairanica*and *Ucasindensis* as bioindicator in Sea Sediments of Sandspit Backwater of Karachi, Sindh

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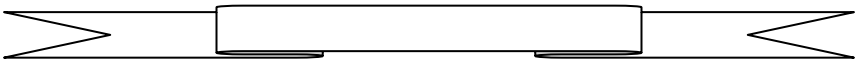
Abstract-The benthic crabs have a direct interaction with the substratum. In the present study, the distribution, composition and seasonal variation of microplastics in two species of crabs were determined with reference to their habitat sea sediment of Sandspit backwater. Sediments and two crab *(Ucairanica and Ucasindensis)* species were collected from three different sites of Sandspit backwater brought to lab for microplastic studies. The sediments were dried in oven for 48 hours at 90^{o}C after drying 50 grams of sediment were taken in beaker and digested and filtered for the available microplastic concentration. The filter papers after drying were observed under stereo microscope. The crabs were dissected and digested in (KOH) and poured at filter paper, than the filter

paper dried and observed through microscope for the presence of Microplastic. The various colours of (threads, beads, films, fragment and foams) MP's were detected in the sediments and crab body. The concentration of microplastics (MPs) in sediments and tissues of the *Austrucairanica*and *Ucasindensis*showed variability and significant difference in response of season and sites. It was concluded that both species of Fiddler crabs are good bio indicators to monitor the MPs pollution at Sandspits mangrove backwater as well as to understand human impacts in coastal ecosystems of Karachi because they are continuously exposed to environmental contaminants.

Keywords: Fiddler crab, Microplastics, sediments, Pollution



Assessment of Major Stored Grain Insect Pests in Wheat: A Case Study in Punjab, Pakistan

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Abstract-Wheat holds immense economic significance in Pakistan as a staple food and plays a crucial role in the global food industry. However, post-harvest damage to wheat is a pressing concern, primarily due to the infestation of stored grain insect pests. This study aimed to identify the most severe insect pest affecting stored

wheat in Punjab, Pakistan. An experiment was conducted to assess the relative damage caused by three major pests: *Ryzoperthadominica, Trogodermagranarium, and Triboliumcastaneum*. The study also determined the mortality rates of these insects under the same environmental conditions. The findings indicated that the lesser grain borer (*R. dominica*) was the most damaging, followed by the khapra beetle (*T. granarium*) and the red flour beetle (*T. castaneum*). Additionally,the khapra beetle exhibited a lower mortality rate compared to the lesser grain borer and red flour beetle. Consequently, the red flour beetle was identified as less destructive and displayed a higher mortality rate than the other two insects. Future research endeavours aim to identify effective methods for eradicating these stored grain insect pests without compromising wheat quality and quantity.

Keywords: Wheat, Insect Pests, *R. dominica*, *T. granarium*, *T. castaneum*, Stored grain

New Locality Record of *Urentiushystricellus* (Richter, 1870) (Hemiptera: Tingidae) associated with Egg Plant from Southernmost Region of Punjab, Pakistan

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Abstract-Family Tingidae is mainly distributed in tropical and temperate regions with approximately 2600 described species across

the world. Members of this family are also known as Lace bugs and have been reported as pests of various cultivated and ornamentals. Association between plant and lace bugs results in the form of plant injuries such as gall formation and leaves staining which also lead stunting plant growth and significant economic losses. During 2021-2022, as a result of extensive survey; number of individuals of lace bugs was collected from district Rahim Yar Khan. This species was previously reported from Pothwar region. However, in this study we have added it as a new distributional record along with brief taxonomic note from Southern part of Punjab province. Detailed description, line drawing and images of damaging symptoms are provided. Further future directions have also been given for sufficient management of *Urentiushystricellus*.

Keywords: *Urentiushystricellus*, Egg Plant,Lace bugs, Economic losses, Pothwar region

Compare Bowen's Technique and Muscle Energy Technique on Hamstrings Tightness in Chronic Non-Specific Low Back Pain Patients

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Abstract-Non-specific low back pain is one of most prevailing illnesses. An extensive list of physiotherapeutic methods are considered which abate pain and ameliorate the functional eminence of patients. Amongst them, Bowen's Technique, that is a little-known myofascial technique and is considered as a holistic approach towards the patient. To compare the effects of Bowen's technique and muscle energy technique on hamstrings tightness in patients with chronic non-specific low back pain. The study was

conducted as a randomized clinical trial. The research was performed at Railway General Hospital, Rawalpindi and Al-Ain Hospital, WahCantt, Pakistan. The participants were 24 patients, aged between 18-35 years, with chronic non-specific low back pain having hamstrings tightness, randomized into two treatment groups. Group A received muscle energy technique, while Group B received Bowen's technique. Moreover, 12 sessions were given for 4 weeks with 3 alternative sessions in a week. Data was analyzed using descriptive analysis, paired t test and Analysis of Covariance (ANCOVA) and Multivariate Analysis of Covariance (MANCOVA) through SPSS 21. The outcome measures were active straight leg raise test (ASLR), active knee extension test (AKET), sit and reach test and numeric pain rating scale (NPRS). On the basis of ANCOVA and MANCOVA analysis, there was a significant difference between groups on all variables after controlling age as a covariate, $F(6, 16) = 9.55$, $p=0.00$, Wilks' $\Lambda = .218$, and partial $\eta^2 = .782$. Adjusted mean with standard errors revealed that Bowen's technique showed more improvement in increasing flexibility than muscle energy technique. Bowen's Technique was more efficacious in improving flexibility of hamstrings in chronic non-specific low back pain.

Keywords: Hamstring Muscles, Manual therapy, Low back pain, Range of motion, Bowen Technique

Influence of Vitamin D_3 and Calcium Oral Supplementation on the Circulatory Vitamin D_3 and Nutritional Status in Women of Different Professions

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Abstract-There is growing interest in the importance of vitamin D, not only in the maintenance of bone health but also in terms of its potential role in the prevention of non-skeletal disorders such as auto-immune diseases, cancer, mental health problems and cardiovascular diseases. The current study was carried out to evaluate the effect of vitamin D_3 supplementation on circulating vitamin D_3 and calcium levels in females of ages 16 to 65 who are students and player, only students, female with Hijab and without Hijab, professional and housewives. Serum vitamin D_3 and calcium levels were compared among different groups and among different batches through ANOVA. $P<0.05$ was considered a significant confidence interval. Results showed that vitamin D_3 and calcium levels were non-significantly increased in students who are players as compere to only students. Also increased in female who are without Hijab as compared with those who used Hijab and also increased in Housewives as compared to professional females. The study concludes that vitamin D_3 supplementation in females with vitamin D_3 deficiency elevated vitamin D_3 as well as calcium levels within 4 months of supplementation at 2-month interval.
Keywords: Vitamin D_3, Calcium, Supplementation, Female, Housewives, Students, Players, Professional

Effect of *Coriadrum Sativum L.* Leaves & Stems on Male Reproduction

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Abstract-Coriander *(Coriandrum sativum L.)* belongs to the family of Apiceae and genus of *Coriandrum L. Coriander* is indigenous to the Mediterranean region and is widely cultivated in Russia, Central Europe, North Africa and Asia. Its common name in India is "Dhanya" and used as an important ayurvedic medicinal plant. Its young leaves are used to make sauces and chutneys. Coriander, which is a small herb, is considered as medicinal plant due to its antihyperglycemic, anti-hyperlipidemic, antiproliferative, hypotensive and digestive stimulant properties. The current study was carried out to investigate the effect of ethanolic extract of *Coriandrum sativum L.* stem and leaves on male reproductive organs using rat as a model system through series of experiment. Our findings suggest that orally administration of coriander extract has negative effect on reproductive organs of rats hence indicating its dose dependent toxicological effects on reproduction. This inhibitory effect of coriander on reproduction might be reversible. Thus, coriander might be serving as a contraceptive agent, blocking reproductive activity temporary.

Keywords: Coriander, *Coriandrum sativum L*, Dhanya, male reproductive organs, toxicological effects

Comparative Evaluation of Different PCR based Diagnostic Assays for Detection of *Mycoplasma gallisepticum*

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Abstract-*Mycoplasma gallisepticum* is an important pathogen responsible for respiratory tract infections in poultry. Clinical

manifestation of disease varies from mild respiratory infection to chronic respiratory disease (CRD) in case of co-infections with other viral or bacterial pathogens. Mycoplasma infections cause huge economic losses due to reduction in hatchability and egg production as well as due to increased morbidity and mortality in a flock. Early and sensitive molecular detection of *M. gallisepticum* has been of foremost importance to initiate therapeutic management of disease. Validation of insulated isothermal PCR (iiPCR) was conducted in comparison with real-time PCR (qPCR) and conventional PCR (con-PCR). Analytical sensitivity was evaluated by preparing 10-fold diluted concentrations of *M. gallisepticum* F (live vaccine), and three field isolates in *M. gallisepticum* broth (10^0–10^7 CFU/ml). Diagnostic performance of iiPCR was assessed by using 95 field samples. Analytical and diagnostic performance of assay was evaluated and compared with qPCR as gold standard. Detection limit of iiPCR was found comparable with that of qPCR. Statistical analysis and comparison of reliability of different PCR based techniques for detection of *M. gallisepticum*provided almost perfect agreement between all techniques. It was found that iiPCR can be a good, efficient and relatively cost-effective alternative to qPCR.

Keywords: Insulated Isothermal PCR, *Mycoplasma gallisepticum*, Real-time PCR, Analytical sensitivity, Diagnostic performance

Frequency of Protracted Shoulders and its Relationship with Interscapular Distance and Thoracic Expansion in Healthy Young Adults.

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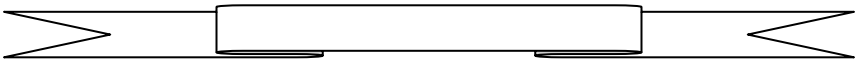
Abstract-To determine the frequency of protracted shoulders in healthy young adults and its relationship with interscapular distance and thoracic expansion at axillary and T4 level. Protracted shoulders are common musculoskeletal conditions in the young population which has an impact on thoracic expansion and interscapular distance. The main contributors to protracted shoulders are poor ergonomics, a sedentary lifestyle, and excessive use of gadgets. In this study frequency of protracted shoulders and its relationship with interscapular distance and thoracic expansion has been evaluated. Cross-sectional analytical study. Study setting: Students from Foundation University Islamabad. 357 subjects were selected based on inclusion and exclusion criteria. All participants were asked to sign a consent form. A plumb line was used to access protracted shoulders and measuring tape was used to measure interscapular distance and thoracic expansion at axillary and T4 level. The study showed that there is a moderately positive correlation between protracted shoulders (PS) and Interscapular Distance. (p=o.436, rs = 0.41). Furthermore, the correlation between PS and Thoracic expansion at the axillary level was strongly positive (p=0.162, rs = 0.74) while a strongly negative correlation (p=o.225, rs = - 0.64) was observed at T4 level. The results of the study concluded that the frequency of protracted shoulders is high among healthy young adults. The study showed that there's a relationship between protracted shoulders with thoracic expansion at the axillary level while no relationship was established at T4 level and with interscapular distance among healthy young adults.

Keywords: Protracted Shoulders, Thoracic Expansion, Young Adults, Interscapular distance



Relationship between Neck Pain, Sleep Quality, and Mindfulness in Undergraduate Medical Students

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Abstract-Neck pain is a chronic musculoskeletal condition and is the fourth leading cause of years lived with disability. It affects the individual's life as it is a constant discomfort that impairs the quality of life. Psychological distress and stress are common among medical students which impacts their mindfulness. Mindfulness is a trait of consciousness that promotes well-being. Due to lack of concrete evidence, this study was done to find the relationship of neck pain, sleep quality, and mindfulness in undergraduate students. To identify the relationship between neck pain, sleep quality, and mindfulness in undergraduate medical students of Rawalpindi/ Islamabad, Pakistan. The study design was analytical cross sectional, and the data was collected from various medical institutes of Rawalpindi and Islamabad over a period of five months. The sampling technique was non-probability based convenient sampling and sample was taken through Raosoft. The data collection tools were Northwick Park Pain Questionnaire, Pittsburg Sleep Quality Index, and Mindful Attention Awareness Scale (MAAS). Statistical analysis was done through SPSS version 21. Normality tests were applied which data was statistically significant. A total of 377 students were included: 286 DPT, 51 MBBS, and 40 BDS students. The mean age was 21.01±1.74. The correlation coefficient between neck pain and mindfulness was -0.288 with a p-value of 0.00. For sleep quality and mindfulness, the correlation coefficient was -0.390 with a p-value of 0.00. In conclusion with increase in neck and poor

sleep quality, mindfulness decreases in undergraduate medical students.

Keywords: Mindfulness, neck pain, quality of life, sleep quality, undergraduate medical student

Salticidae (Jumping Spider) of Karachi Sindh Provence Pakistan

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Abstract-Karachi begun as a little angling town called Mai KOLACHI it is lie in Sindh province. Its position is 24°51′36″N, 67°00′36″E Altitude 8 meters AMSL total 3,527 km² Karachi is comprise 18 villages and 178 Unions council. It was reputed to be the cleanest town of the sub-continent till 1947 with a population of 200,000. The current survey is consist total 1020 specimen 500 are immature (jivinal) can, not identified up to species level but rest of all identified up to species level according to identification 15 species 13 genera out of this few species are recoded already but mostly are first time recorded from study areas.

Keywords: Jumping Spider, Pakistan, Salticidae, new records

Intraspecific Morphometric Variation in the Tadpoles of Hazara Frog *Allopaa hazarensis* (Anura: Dicroglossidae)

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Abstract-Hazara Frog (*Allopaa hazarensis*), Family Dicroglossidae, is endemic to Hindu Kush and Himalayan region. The frog species is associated with high altitude forested montane wetlands in Pakistan. The original description of the tadpoles and data on morphology and some basic morphometric measurements are available. We aimed to describe the intraspecific variation of the tadpoles of Hazara Frog (*Allopaa hazarensis*) at hind limb bud development stage (Gosner stage 25-30, n= 23), toe differentiation stage (31-39, n= 49) and metamorphic stage (40-42, n= 20) collected from the selected streams of District Buner, Province Khyber Pakhtunkhwa (KPK), Pakistan. We found that the mean body length, total length, tail length, body height, eye diameter, inter orbital distance, oral disc width and tail muscle width differed significantly among the studied stages. The body length of the metamorphic stage was significantly higher than the hind limb bud development stage and toe differentiation stage. The measurements such as maximum tail height, ventral fin height, dorsal fin height, snout-nares distance, inter narial distance and tail muscle height in metamorphic stage were significantly higher than the toe differentiation stage. The correlation between ventral fin height and dorsal fin height in hind limb bud development stage, toe differentiation stage and metamorphic stage; between inter orbital distance and inter narial distance in toe differentiation stage and metamorphic stage and between snout nares distance and eye nares distance was non-significant. The correlation for all other studied measurements in the three studied stages was significant. We provide first comprehensive data on different stages of tadpoles of Hazara Frog.

Keywords: Morphometric variation, Hazara Frog, Wetlands, Tadpoles, Differentiation stage.

Identification and Antibiotic Susceptibility Profiling of Bacteria Isolated from Backyard Poultry

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Abstract-Backyard poultry is an important field about socio economic perspective both in developed and underdeveloped countries. This concept is increasing worldwide to meet the daily needs of household. But the increasing concept of backyard poultry is facing different challenges that can affect backyard poultry. The backyard poultry is mostly affected by microorganisms like bacteria, viruses and fungi. Among them bacterial diseases are major cause of zoonotic diseases and infection in poultry birds. The bacterial diseases in poultry bi steroids cause us socio-economic loss. To control this bacterial attack different kinds of antibiotics are used in the backyard poultry. This excessive use of antibiotics makes the bacterial profile more susceptible against these antibiotics. The pathogenic bacteria develop resistance against these antibiotics. The study was designed to identify the pathogenic bacteria present in the backyard poultry from fecal and rectal samples. The biochemical identification and antibiotic resistance of the isolates were performed. Different biochemical tests (Methyl Red, Citerate test, Catalase test and Glucose utilization test) and gram staining techniques were performed for the identification of pathogenic bacteria. Kirby Bauer Disc Diffusion method was applied to check the antibiotic resistance of the isolates. The study shows the presence of *E. coli*,*Salmonella* and *Staphylococcus* in backyard poultry with percentage ratio of 68.3%, 3.3% and 13% respectively. The isolates were found resistance against different antibiotics like AMX- 25µg, VAN-30 µg, P-10 µg, LS-109 µg and found susceptible against Cip-5 µg, OT-30 µg, ENR-5 µg and S-10

µg respectively. The *E. coli* was found Resistance against VAN, AMX with percentage ratio of 100% and 85% respectively. While found susceptible against Cip, ENR and CN with a percentage ratio of 100%, 80% and 82% respectively. Along with this, *Salmonella* was 100% resistance against AMX, VAN and P and susceptible against Cip and CN-10 µg. The *Staphylococcus* is 100% resistance against S, OT, and ENR while found susceptible against CN, AMX, and VAN, with a percentage ratio of 100% as there is no zone of inhibition was formed. This study confirmed the presence of pathogenic bacteria in backyard poultry. The excessive use of antibiotics to improve the growth and production of poultry makes them resistance against these antibiotics. Besides, that the improper handling and lack of biosafety measures increase the zoonotic diseases in humans. Limited use of antibiotics and proper biosafety measures should be adopted in backyard poultry. It can reduce the prevalence of pathogenic bacteria in backyard poultry and risk of zoonotic disease will reduce.

Keywords: Backyard poultry, *E. coli*, *Salmonella, Staphylococcus*, Antibiotic Resistance

Genetic Alteration in a Pakistani Population with Breast Cancer

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Abstract-Breast cancer is a significant health concern globally, affecting women in both developed and developing countries. This study focused on analyzing the mutational profile of the MAPK pathway gene, BRAFV600E, in breast cancer patients from Pakistan. The duration of the current study was 1.5 years which also includes the sampling period. Approval for sample collections was obtained from Holy Family Hospital Rawalpindi and PIMS

Islamabad, and data from breast cancer patients was collected with their consent. DNA of the collected tissue samples was extracted. Following primer designing and optimization trials, PCR was conducted for the amplification of the BRAF gene, and the resulting products were confirmed through gel electrophoresis. Sanger Sequencing was performed, and Chromas software was used to analyze the sequenced data. The demographics of the studied sample showed that most patients were between the ages of 41 and 60 years, with ductal carcinoma being the most prevalent type. The majority of the patients were married and had given birth to four or fewer children. Most patients had a positive history of breastfeeding and lactation, and only 18.75% had a family history of breast carcinoma. Furthermore, the study explored various clinical features and factors associated with breast cancer. The study sample showed that all the samples are wildtype for BRAFV600E lacking reported T>A transversion. Conclusively, the mutational profile of BRAF in studied breast cancer patients showed no significant association of the BRAFV600E variant with prognosis of breast cancer. The findings of the current study suggested that the BRAFV600E variant is not assessed as a potential diagnostic and therapeutic target for Pakistani breast cancer patients. These findings provide valuable insights into the genetic and clinical characteristics of breast cancer in the Pakistani population, contributing to a better understanding of the disease and potential future treatment strategies. The role of the BRAFV600E mutation in breast cancer progression is still not clear. The current study highlights the need for further research to unveil the genetic basis of breast cancer including specific genetic variations and mutations associated with various subtypes of breast cancer among the Pakistani population, which is a demand of the current era. Improving public awareness about the genetics of breast cancer enables us to understand the risk of breast cancer, pursue genetic testing if necessary, and actively look for early diagnosis, thereby improving the prevention and treatment outcomes. Such

research avenues can lead to the investigation of potential population-based therapeutic targets and the design of personalized treatment strategies, improving the outcomes and well-being of breast cancer patients in Pakistan.

Keywords: MAPK, BRAFV600E, Breast Cancer, Pakistan

Analysis of Mutational Profile of Breast Cancer Patients

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Abstract-Among different types of cancer, the 2nd leading cause of death is breast cancer as its incidence is increasing rapidly among both genders. Breast cancer, a prevalent malignancy, is influenced by multiple risk factors including age, age of menarche, age of menopause, obesity, gender, physical inactivity, hormones, and smoking leading to its heterogonous nature. There are multiple genes of different pathways that play a significant role in the progression of breast cancer. One significant pathway implicated in cancer development is the MAPK pathway, which regulates cell growth, differentiation, and survival. The focus of this study is the hotspot SNP rs11628333 of MAP3K9 gene within the MAPK pathway. MAP3K9 is an important gene that interacts with diet and lifestyles factors and show significant association with breast cancer in most of the studies. MAP3K9 is a regulator of JNK pathway that plays role in cellular division, normal and malignant cellular growth. MAP3K9 homozygous variant genotype was noted to be a key player in the increased risk of cancer by the activation of JNK pathway and show more sensitivity to obesity and diabetes. The research employs a comprehensive approach to understand the genetic variations present in breast cancer patients. The study meticulously outlines the materials and methods utilized. Tumor

samples were obtained and processed, followed by DNA extraction to isolate the genetic material of interest. Polymerase Chain Reaction (PCR) was performed to amplify the specific segment of the MAP3K9 gene, facilitating its further analysis. Gel electrophoresis was employed to separate and visualize the PCR products, enabling the identification of the target DNA fragment. A crucial step in the investigation involved Sanger sequencing, a gold standard technique for DNA sequencing. Chromax software played a pivotal role in the data analysis process. The software enabled the visualization and interpretation of the sequencing data, allowing researchers to pinpoint the exact location and nature of the mutation within the gene. A pivotal finding is the identification of a heterozygous mutation within the MAP3K9 gene in tumor samples. It was observed that the ancestral allele T changed into C in tumor samples that showed 100% (T/C) heterozygous mutation in postmenopausal women. This mutation is of great interest due to its potential implications for tumor development and progression. The findings of current study contribute valuable insights into the genetic landscape of breast cancer. By exploring the MAPK pathway and identifying a heterozygous mutation within the MAP3K9 gene, the study sheds light on potential genetic factors influencing breast cancer development. This research enhances our understanding of breast cancer's genetic basis and may pave the way for more targeted therapeutic interventions in the future.
Keywords: Mutational Profile, Breast Cancer, MAPK pathway, Malignant cellular growth, DNA fragment

First record of *Chronoxenuswroughtonii* (Hymenoptera: Formicidae) from Pothwar Region of Pakistan

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Abstract- Chronoxenus is an important genus of subfamily Dolichoderinae and family Formicidae. They inhabit under rocks, dead tree logs and open soil nesting and have predatory behavior for other ants and arthropods. Only 6 valid species have been reported from this genus throughout the world. No species of this genus has been reported from Pakistan, although some species have been reported from India. Keeping in view of this situation, multisite surveys were conducted in various localities of Pothwar region during 2022-2023. Ants belonging to this genus were collected from various habitats randomly. They were identified using available literature. As a result of these studies, *Chronoxenuswroughtonii* is recorded for the first time from Pakistan. Main identification characters of this species supported with measurements and illustrations are provided here with notes on distributional range. Remarks along with photographs of nests of this species have been provided. Our results have added a new record in the fauna of Pakistan. This species has been found predatory in nature so it can be applied as biocontrol agent for the management of other arthropods.

Keywords: Chronoxenus, Dolichoderinae, Formicidae, First record, Pakistan.

Homozygous Missense Variant in *SAMHD1* Gene Underlies Aicardi-Goutières Syndrome

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Abstract-Aicardi-Goutières syndrome (AGS) is a rare genetic disorder characterized by inflammatory manifestations and aberrant immune responses with seven known genes. This study aimed to identify the sequence variant responsible for segregating AGS related phenotypes in two unrelated consanguineous Pakistani families. Whole exome sequencing followed by Sanger sequencing revealed a recurrent homozygous missense variant, c.868C>T; p.Arg290Cys, in the *SAMHD1* (MIM: 606754) gene segregating the disease phenotype in autosomal recessive manner in all affected individuals of both families. This alteration is predicted to have functional consequences, potentially impairing the role of *SAMHD1* in immune regulation and nucleotide metabolism. The clinical features observed in affected individuals, including chilblain-like skin lesions and neurological abnormalities; align with the characteristics of AGS5 (MIM: 612952) in both families. The current molecular genetic investigation significantly broadens our understanding of *SAMHD1*'s mutational spectrum, revealing its involvement in AGS. Furthermore, this study highlights the genetic heterogeneity of *SAMHD1* within the Pakistani population.

Keywords: AGS, *SAMHD1*, WES, AGS5, chilblain skin lesions, neurological abnormalities

Nested PCR Based Characterization of Infectious Bovine Rhinotracheitis Virus in Cattle and Buffaloes

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Abstract-The study was conducted to find occurrence of BoHV-1 in the cattle and buffalo of district Lahore and Rawalpindi. The research was based on isolation and identification of BoHV-1 from cattle and buffaloes from Lahore and Rawalpindi. Molecular characterization and sequence analysis of BoHV-1 isolated from cattle and buffaloes were also performed. Current study was carried out on 100 samples from district Lahore (50 samples) and Rawalpindi (50 samples) against the BoHV-1 infection. For collection of the samples, blood was drawn into EDTA tubes, transported to the lab, and kept there chilled at 4°C. After that samples were processed for Nested PCR and the study of BoHV-1 was carried out through phylogenetic analysis. Among collected samples, 6 were found to be positive for BoHV-1 using PCR and gel electrophoresis techniques. The ratio of positive samples was recorded as 6%. PCR products from two positive samples were sequenced commercially. Phylogenetic analysis was performed, and a neighbor-joining test was conducted to construct a phylogenetic tree using MEGA 11 software. In Gene Bank the gene sequences were subjected to blast search. Two positive samples of variable sizes were obtained that is BoHV1 Isolate 2023-1 Lahore, Pakistan PMAS UAAR and BoHV1 Isolate 2023-2 Rawalpindi, Pakistan PMAS UAAR. When the gene sequences were compared to the gene sequences from Gene Bank, It was noted that no considerable changes are present among the gene sequences showing high resemblance with the isolates seen throughout the world. This resemblance indicates insignificant changes among the gene

sequence present throughout the world turning down any probability of mutation. The similarity also indicates that the similar strains must have been spread to various regions of the world either by artificial means like trading or by natural means like migration of animals. From the results of current study, it was concluded that the BoHV-1 is prevalent in the cattle and buffaloes of district Lahore and Rawalpindi. Effort should be made in educating the farmers for effective control of BoHV-1. Regular surveillance, appropriate prophylactic or therapeutic remedies are needed to monitor and understand the epidemiology of this virus. Effected animal should be separated from healthy ones and should be treated properly. Contact between healthy and disease animal should be avoided. Proper immunization protocol should be followed as well as good managemental practices should be adopted in order to control this virus. These types of studies are needed for the determination of the BoHV-1 strain circulating in Pakistan which will be helpful for development of an effective local vaccine. Further studies of more viruses isolated from different localities of Pakistan are needed. Molecular characterization on large scale is also required which will be helpful for clear understanding of the virus epidemiology and preparation of effective local vaccine.

Keywords: BoHV-1, Nested PCR, Infectious Bovine Rhinotracheitis, Molecular characterization, Pakistan

Morphological and Morphometric Analysis of *Euphlyctis Kalasgramensis* (Anura: Dicroglossidae) in Rawalpindi-Islamabad Area

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Abstract-The Amphibians are biphasic, spending their early ephemeral tadpole stage in water and transforming into adult

terrestrial form. The Common Skittering Frog (*Euphlyctiskalasgramensis*) is widely distributed in Pakistan. The current study aims to generate data on morphology, and morphometry of the Common Skittering Frog (*Euphlyctiskalasgramensis*) which could be used for identification of species, to understand its taxonomic status and comparison could be made with specimens from other geographic areas. The sampling (n=97) is done on selected streams of District Rawalpind and Islamabad Pakistan. The results of our study show that the average SVL of type A (46.40± 1.69), B (47.76± 2.28), C (47.69± 1.26), D (40.42± 2.06) that is not similar with *E. kalasgramensis* described by Ali et al., 2020 (SVL= 38.11± 0.87) and Howlader et al., 2015 (37.88 mm). The length of the head is greater than width of head, nares are close to snout as compared to eyes, the width of upper eye lid is greater than length of intra-orbital. Principal component analysis resulted in three principal components, which accounted for most of the variation. The first three principal components were responsible for 92% variability in the data. The first principal component showed 88.50%, the second showed 2.7% and third showed 1.5% of total variation. In first component six variables viz. snout-vent length, head length, head width, thigh length, shank length and foot length were found significant (r>0.2). Five variables were found significant in the second principal component (r>0.2), the variables are snout-vent length, intra-orbital distance, anterior intra-orbital distance, foot length and tarsus length. In the third principal component five variables were found to be significant, which includes snout-vent length, inter-narial distance, thigh length, foot length, and shank length**,** respectively. The variables with high factor loading (values >20%) includes snout-vent length, head length, head width, thigh length, shank length, and foot length and were positively correlated. The second component explains 2.78% of variation and third component explains 1.56% of variation. The second components constitute values for both positive and negative

factor loading (such as positive correlation with snout-vent length and foot length, and negative correlation with intra-orbital distance, anterior intra-orbital distance and tarsus length). The third component also gives values for both positive and negative correlation (such as positive correlation with snout-vent length and inter-narial distance, and negative correlation with thigh, shank and foot length). The two-dimensional graph of 23 morphometric measurements of four forms (Type; A, B, C, D) on PC1 and PC2 axis accumulates 80.8% of all variability. The Pillai's Trace test statistics is statistically non-significant [Pillai's Trace = 0.84, F (69, 219) = 1.23, p= 0.12] indicating that the four types has no significant association with the 23 studies morphometric measurements. But inspite of the statistical analysis, we recorded morphological variations in the study area, which would be beneficial to reduce the taxonomic issues in future.

Keywords: Amphibians, Common Skittering Frog, Morphology, Morphometry, Taxonomic status

Prevalence of Gastrointestinal Parasites in Selected Population from Gujranwala, Pakistan

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Abstract- Gastrointestinal parasites are major threat in developing countries like Pakistan. They cause various diseases related to digestive tract with serious consequences. Present study was conducted to investigate the prevalence of intestinal parasites in pathology ward of public hospital, Gujranwala to association between prevalence of intestinal parasitesand various associated risk

factors related to socio-demographic characteristics. Total 318 stool samples were collected and examined under microscope using wet mount technique along-with filling questionnaire related to possible risk factors. The result indicated seven species of intestinal parasites including four helminthes and three protozoan parasites. Total prevalence of intestinal parasites was 78.3% (n=249 cases) including male and female patients. In 249 cases, helminthes parasites prevalence include *A. lumbricoides* with prevalence rate 39.3% (n=125 cases) fallowed by *H.nana* 3.1% (n=10 cases), least prevalence rate was of *S.stercoralis* and *T.saginata* with 1.9% each (n=6 cases). Among protozoan parasites, high prevalence rate noted for *G.lamblia* 7.2 % (n=23 cases) fallowed by *E.histolytica* 6.6 % (n=21 cases) and least prevalent rate for *E.coli* with 1.9% (n=6 cases). Among single infections the most prevalent parasite was *A.lumbricoides* and least prevalent parasite were *S.stercoralis, T.saginata* and *E.coli*. It is concluded from study that most common and major cause of transmission of intestinal parasites were contaminated water, food, soil and surrounding environment. So proper treatment is use of Albendazole recommended by WHO's and adopting preventive measures to eradicate the intestinal parasites prevalence from population.

Keywords: Gastrointestinal parasites, public hospital, Preventive measures, Parasites prevalence

Evaluation of Co-Infection Dynamics of *Ornitho bacterium rhinotracheale*, Avian influenza virus-H9, and Infectious Bronchitis virus in Poultry

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Abstract-Respiratory illnesses can lead to severe economic losses within the poultry sector. One such bacterium, *Ornithobacteriumrhinotracheale* (ORT), along with some viral co-infection responsible for respiratory tract infections, which has emerged as a significant challenge in intensive poultry farming. This epidemiological study aimed to assess the prevalence of *Ornithobacteriumrhinotracheale* (ORT) through serological techniques and investigate the co-infection of ORT with the viral pathogens (H9N2 and IBV) across various poultry groups, encompassing broilers, broiler breeders, and layers through molecular techniques. A total of 519 samples were collected (n= 50:44 tissue/swab and 425 sera) and analyzed. A total of 425 serum samples were serologically analyzed, with 239 (56.23%) seropositivity of ORT. Notably, a higher incidence of seroconversion was observed in broiler breeders (69.51%) when compared with broilers (46.47%) and layers (49.57%). In parallel, molecular detection through PCR was conducted on 94 tissue and swab samples, identifying 44 instances of ORT presence. Among these 44 positive ORT cases, 11 (25%) were concurrently infected with AIV-H9, while 7 (15.90%) showed mixed infection involving IBV. Our study revealed that co-occurrence of ORT/H9N2 and ORT/IBV was underestimated and urgently needed for further investigation in Pakistan. Moreover, the highest positive PCR and seropositivity were found in broiler breeders in Punjab during winter season. This study signifies the inaugural documented identification of ORT in Pakistan, underscoring the commonplace nature of ORT infections within the region. Given the current absence of an ORT vaccine, effective disease management and stringent biosecurity measures assume critical importance in controlling the spread of this ailment.

Keywords: Zoology, *Ornithobacteriumrhinotracheale*, Avian influenza virus-H9, Infectious bronchitis

Investigating the Combined Medicinal Effects of *Withania Somnifera* (Ashwaghandha) and *Murraya Koenigii* (Curry Pata) In Vitro

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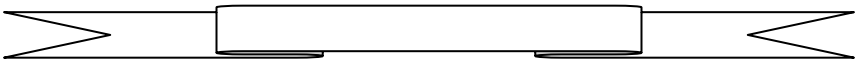
Abstract-To evaluate synergistic medicinal effects of *Withaniasomnifera* (Ashwaghandha) and *Murrayakoenigii* (Curry pata) *in vitro*. Antimicrobial activity was determined using disc diffusion method against five bacterial and two fungal strains. The antioxidant activity was evaluated by the DPPH assay. The antidiabetic activity was evaluated by alpha-glucosidase inhibition assay and alpha-amylase inhibition assay. Synergistic antibacterial activity was observed against all the strains of bacteria either Gram-positive or Gram-negative and fungi under study conditions. The maximum antibacterial activity was displayed by combined extract against *E. coli* i.e., 26±0.4mm. Maximum antifungal activity was showed by combined extract against *Aspergillus niger* i.e. 17.3±0.5mm. Antioxidant activity of the combined extract was also significant. Alpha-glucosidase inhibition and alpha-amylase inhibition assays also showed synergism. Results indicate that *Withaniasomnifera*and *Murrayakoengii*have medicinal properties. The combined extract of both plants is more potent than their individual extracts suggesting that these can work in synergism. The research suggests that different plant extracts could be used in

combination to increase their medicinal activities by many folds thus giving an insight into future use of herbal medication.

Keywords: *Withaniasomnifera* (Ashwaghandha), *Murrayakoenigii* (Curry pata), Antimicrobial activity, Antidiabetic activity, Alpha-glucosidase



Genetic Analysis Reveals a Rare DWR72 Gene Mutation Underlying Amylogenesis Imperfecta in a Pakistani Kindred

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Abstract-Dental enamel malformations, or amelogenesisimperfecta (AI), can be isolated or syndromic. To improve the prospects of making a successful diagnosis by genetic testing, it is important that the full range of genes and mutations that cause AI be determined. Defects in WDR72 (WD repeat-containing protein 72; OMIM *613214) cause AI, type IIA3 (OMIM #613211), which follows an autosomal recessive pattern of inheritance. The defective enamel is normal in thickness, severely hypomineralized, orange-brown stained, and susceptible to attrition. Using whole exome sequencing followed by sanger sequencing, we identified a previously reported *WDR72* nonsense mutation c.2686C>T: p.(Arg896*) in a family segregating in autosomal recessive manner with the said phenotypes in the pedigree. Percentiles of stature and body weight varied among affected individuals but did not show a consistent trend. These studies support the idea that WDR72 mutations cause a non-syndromic form of AI and improve our ability to diagnose AI caused by *WDR72* defects.

Keywords: *WDR72, Amelogenesisimperfecta,* hypomineralized, whole exome sequencing

Antimicrobial Evaluation of Bacterial Isolates from Pus Samples in Khyber Teaching Hospital, Peshawar, Pakistan

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Abstract-Pus is characterized as a greenish-yellow or brown fluid that is thick and rich in proteins. It may have a foul smell. In our study gram negative bacteria (62.5%) were dominant than Gram positive bacteria (37.5%). Out of 147 samples only 40 samples showed positive growth and the rest were characterized with No growth. The most dominant microbe found was *Escherichia Coli* 14(35%) and *Staphylococcus Aureus* 14(35%). Other prevalent species included *Pseudomonas aeruginosa* 6(15%), *Enterobacter species* 5(12.5%) and the least prevalent isolate was *Staphylococcus Epidermitis* 1(2.5%). Infection was more prevalent in males 23(57.5%) than in females 17(42.5%). Pus infection was more prevalent in age group 0-10 (30%) and 21-30 (25%). Antibiotic susceptibility results show that Gram Negative bacteria showed absolute sensitivity towards Meropenem (100%). Piperacillin-Tazobactum(96%), TGC(88%) , Amikacin(88%) were also found to be highly effective against infection. High resistance was observed at Cefotamixe (56%). Gram positive bacteria show resistance towards Trimethoprim+Sulfomethoxazole (80%). Effective drugs included Amikacin (100%), Doxycycline (100%), Fusidic acid (80%) and Gentamycin (93.4%). The results of different studies compared with our study show that predominant isolates in pus samples can vary among different regions of the globe. This study was conducted for the isolation and identification of different

bacterial isolates predominant in pus samples. Gram negative dominated gram-positive bacteria. In current study infectious pathogens were *Staphylococcus aureus, Escherichia Coli, Pseudomonas aeruginosa, Enterobacter species and Staphylococcus Epidermitis. Staphylococcus Aureus and Escherichia Coli* were dominant isolates. All the bacterial isolates showed sensitivity towards Amikacin and resistance was developed against CTX and SXT. Strategies can be made to reduce the rate of resistance much better therapeutic treatments can be designed against antibiotic resistant microbial species.
Keywords: *Escherichia coli,* gram negative, gram Positive, antibiotic resistance, Antibiotic susceptibility

Study of Effect of Antibiotics on Microbial Isolates from *A.mellifera* Brood

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Abstract-The aim of current study is to characterize the isolates from European honeybee colonies showing EFB disease's symptoms and to determine the effectiveness of antibiotics against the EFB disease causing bacteria. For this purpose, diseased larvae samples of *Apismellifera* showing European foulbrood symptoms were taken from two areas: Hafizabad and Sheikhupura. Effect of antibiotics from groups Cephalosporins (Velosef and Keflex) and Aminoglycosides (Kanamycin and Amikin) were studied against the isolates collected from diseased colonies. Morphological, biochemical and molecular identification of isolates was carried out. A spore forming bacterium *Bacillus paralicheniformis* was

molecularly identified by using 16S rRNA gene, from isolate S4. The mean of zones of growth inhibition for all the bacterial isolates by Amikin, Kanamycin, Keflex and Velocef was 24.9mm, 24.5mm, 21.04mm, and 15.95mm, respectively. With 200µl antibiotic, MIC of Kanamycin and Amikin was 30µg, and Keflex and Velosef was 45µg. It can be concluded that Kanamycin and Amikin were found more effective to control the European foulbrood disease comparative to Keflex, and Velocef. The efficiency order of antibiotics was as follows, Amikin> Kanamycin > Keflex >Velocef.

Keywords: Antibiotics, Microbial Isolates, *A.mellifera*,European honeybee colonies, EFB disease

Comparison of Physicochemical Characteristics of Honey Produced by *Apis florea* and *Apis dorsata* Honey Bee Species from Pakistan

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Abstract-This study was aimed to compare the physicochemical characteristics of honey produced by *Apisflorea* and *Apisdorsata* honey bees in Pakistan. A total of 64 Honey samples (32 of each species) were collected from different localities, Bhakkar, KalarKahar and Shorkot. The predominant vegetation in these areas were *Eucalyptus, mulberry, Acacia, Zizipus Jojoba, Neem, Sheesham, Citrus* and Mango. The physicochemical methods used for the characterization of honey are those as recommended by International Honey Commission. Most of the *A.dorsata* honey samples had moisture content beyond the maximum limit, whereas *A.florea* honey samples had moisture content within the limit of International Standards. *A.florea* honey's pH was more than

A.dorsata honey. The mean electrical conductivity (0.823mS/cm) and free acidity (11.56meq/kg) in *A.florea*honey samples was higher than average EC (0.741mS/cm) and FA (9.16meq/kg) of *A.dorsata* honey. Lactone content was recorded as (4.81 meq/kg) in *A. florea* honey, lower than (5.30 meq/kg) lactone content in *A.dorsata*honey. More proline content (559.15mg/kg) in *A.dorsata* than *A.florea* honey (362.72mg/kg). Average HMF content (43.01mg/kg) in *A.florea* and 118.22mg/kg were found in *Apisdorsata* honey samples. The range (6.97-15DN) of diastase number of *A.dorsata* honey samples was lower than *A.florea* honey. The present investigations concluded that honey produced by *Apisflorea* and *Apisdorsata* showed various quality parameters close to the International Honey Standards, except moisture content in *Apisdorsata* honey which were beyond the recommended limit (21%) and could be used as distinguishing parameter of honey produced by this honey bee species.

Keywords: Physicochemical, *A.dorsata,* comparison, honey, analysis, *A.flore*

Prevalence and Frequency of Parasitic Mite (*Varroa destructor*) in *Apis mellifera* Colonies

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Abstract-This study was conducted with the objective to check the prevalence and frequency of parasitic mite (Varroa destructor) in Apismallifera colonies from November 2022 to May 2023. Varroosis has received little attention in the Punjab, province of Pakistan, therefore district Jhang and Toba Teksinghaparies were selected as study areas. About 10% bee colonies (10 bee colonies)

from total colonies in any apiary were inspected. Five different apiaries were selected from two districts, Jhang (JA1-JA5) and Toba Tek Singh (TA1-TA5). Visual inspection of selected colonies was carried out monthly and data was recorded in quantitative term. Infested colonies were marked and checked regularly, while the healthy colonies were inspected randomly from each apiary. The prevalence of *V. destructor* in *A. mallifera* colonies of district Jhang observed as follows December 0.9%, January 1.91%, February 7.08%, March 6.51%, April 7.66% and May 2.1%. In district Toba Tek Singh 0.8% in December, 2.4% January, 3.5% February, 6.7% March April 9.2% and May 5.7% was recorded. It can be concluded that V. destructor was more prevalent during the month of April 2023 in both districts. To control *V. destructor* Sulphur powdered and Chinese herbicides sprays were used by the bee keepers that proved effective against disease. Field pictures are part of the thesis. Obtained data was subjected to appropriate statistical analysis.
Keywords: *Varroa destructor*, *Apismellifera*, apiary, mites

ABSTRACTS
POSTER
PRESENTATIONS

BOTANY

Evaluation of Biological Activities and Nutraceutical Potentials of Selected Wild Vegetables

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Abstract- Present study is aimed to investigate bioactivities and nutraceutical potential of selected wild vegetables. Anti-oxidan and cytotoxic activity was evaluated by DPPH method and brine shrimp lethality assay respectively. Anti-bacterial activity was evaluated by Agar Well Diffusion Method. Phytochemical screening, mineral content and proximate analysis were done by standard method. Antioxidant assays depicted that Malva parviflora and Lathyrus aphaca have good antioxidant potential as compared to Melilotus indica. M. parviflora leaves showed better cytotoxicity than L. aphaca and M. indica. High protein content was shown by Malva while Lathyrus and Melilotus found rich in carbohydrates. Preliminary phytochemical analysis indicated that alkaloids, phenols, flavonoids and glycosides were present in all investigated plants while tannins and terpenoid were present in Melilotus and Lathyrus and steroids were present only in Melilotus. Saponins and resins were absent in both Melilotus and Lathyrus. Anthraquinons were present in Malva and Lathyrus.

Elemental analysis showed the presence of Na and K in higher concentration among all plants as compared to Zn, Fe, Cu, Cr, Cd and Mn. Selected plants have effective therapeutic efficacy for prevention of chronic diseases, to improve health, delay aging process and increase life expectancy or function of the body.

Key words: Phytochemical screening, antioxidant, antibacterial, cytotoxic activity, proximate and elemental analysis.

Morphological and Biochemical Characterization of Carom (*Trachyspermum ammi* L.)

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Abstract- *Trachyspermum ammi (L.)*, commonly known as caraway (Ajwain) is an erect, branched annual herb, 60-90 cm tall, belonging to the family Apiaceae. The plant is used traditionallyas a stimulant, carminative, flatulence, atonic dyspepsia, diarrhea, abdominal tumors, abdominal pains, piles, and bronchial problems, lack of appetite, galactogogue, asthma and amenorrhoea. The present study was done to determine the diversity of *Trachyspermum ammi*in 17 accessions on the basis of morphological and biochemical characters. Experimental work was conducted at Plant Genetic Resources Institute (PGRI), NARC Islamabad. Firstly,accessions including local and exotic varieties were selected for research work then length and number of branches was measured. Flowering time was also noticed from initial flowering to 50% flowering. After morphological characterization, fresh leaves were collected, and methanol extract was prepared for the checking the flavonoids and polyphenol content and for evaluating their antioxidant potential through DPPH scavenging assay. The results showed enough phenotypic and biochemical variation among different accessions of Ajwain. This study may help in effective crop germplasm and in improving the quality, quantity and breeding of Carom and necessitates the need of advance research to reduce theeffects of genetic erosion.

Keywords: Ajwain, plant accessions, morphological markers, biochemical contents

Morphological and Biochemical Characterization of Fennel (*Foeniculum vulgare* Mill.)

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Abstract- *Foeniculum vulgare* Mill. commonly known as Fennel (Soonf), belongs to the Apiaceae. It is an upright, perennial herb with vast medicinal and culinary uses. It is frequently used to treat various ailments related to the digestive, endocrine, respiratory and reproductive systems. This study elucidates the morphological and biochemical variability of Fennel. The main aim was to determine the diversity of *Foeniculum vulgare* 12 accessions based on morphological and biochemical characteristics. Experimental work was conducted at a Plant Genetic Resource Institute (PGRI) lab, NARC Islamabad. Firstly, 12 different accessions were selected for research work. Their seeds were then sown and grown, and the number of branches was measured after some time. Flowering time was also noted from initial flowering of 50% plants. After morphological characterization, fresh leaves from 12 different accessions of fennel were collected and methanol extract was prepared for evaluating their antioxidant activity, through a DPPH scavenging assay and for checking the flavonoids and polyphenol content. The result showed enough variation among different accessions of fennel for several yield-attributing traits. It has been verified that morphological and biochemical traits were extremely variable. This study may help in effective management of crop germplasm and in improving the quality, quantity and breeding of fennel and requires advance research to reduce the effects of genetic erosion.

Keywords: Fennel (Foeniculum vulgare), Morphology, Total Polyphenols determination, Flavonoids, antioxidant activity.

Application of Bioinoculant as a Plant Growth Promoting Rhizobacteria (PGPR) for Sustainable Agriculture

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Abstract-With the climate change scenario and looming world population predicted upto 8 billion people by 2050 is a huge challenge for the agriculture sector to sustain and ensure the food security according to the demand. In retrospect, the climate changes encompassing biotic and abiotic stresses hampering the sustainable agricultural lands severely. Abiotic stresses include rising annual temperature, unseasonal heavy rainfall, drought, salinity, precipitation, humidity, heavy metals exposure, nutrient deficiency, and flooding, respectively. Besides, the biotic stresses as biotic agents viz., bacteria, fungi, viruses, nematodes, insects, and weeds encounter and disturb the normal metabolism host and deleteriously retarding the plant growth and development, as well as vigorously threatening the agriculture land fertility. Therefore, to overcome these constraints the strategies have adopted, organic fertilizers, resistance varieties and environment unhealthy agrochemical inputs mainly pesticides, herbicides, fungicides and chemical fertilizers, respectively. Food insecurity is a chronic issue therefore in order to combat the current situation, for sustainable agriculture with ecofriendly environment use chemical-free alternative symbiotic phytomicrobiome (PGPRs) as a biofertilizers can be a feasible option to the farmers to increase crop productivity.

Keywords: Phytomicrobiome; PGPRs; Biofertilizers; Crop productivity; Food insecurity

Phytoremediation Capacity of *Alstonia scholaris* L. Plants Irrigated with Heavy Metals (HMs) Contaminated Wastewater

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Abstract- *Alstonia scholaris* L. Is an evergreen, fast-growing plant with a high air pollutant adsorbent rate. The present study was conducted to examine the phytoremediation potential of *A. scholari*s while the plants were irrigated with household wastewater (HHWW) and tannery wastewater (TWW). For the experiment, three months old seedlings of *A. scholaris* were planted in plastic pots in an open nursery where the plants were regularly irrigated with HHWW and TWW treatments 2-3 times a week. Various agronomic parameters were weekly noted. In addition, the growth rate, biomass production rate, and various physiological parameters like chlorophyll content, electrolyte leakage, MDA content, DPPH scavenging activity, antioxidants (SOD, POD CAT) level, HMs contents (Cd, Pb, Zn) were measured at the end of the trial. In place of this, the Bioconcentration factor, Translocation factor, and Tolerance Index were calculated to estimate the phytoextraction, phtyoaccumulation, and tolerance ability of *A. scholaris* plants under TWW and HHWW contaminated areas. The results indicated a reduction in the biomass production rate from 297.67 g to 30 g under TWW treated plants while HHWW treated plants showed a higher biomass production rate (from 297.67 g to 298.17 g). Similarly, photosynthetic pigment contents and EL % were also significantly decreased under TWW irrigated plants than HHWW irrigated plants. Meanwhile, the results of this research evaluated

that retarded growth, lower biomass production rate, higher cellular damage intensity, higher EL %, higher oxidative stress, and higher HMs contents were found in TWW irrigated plants which proved less tolerance rate of *A. scholaris* plants in industrial wastewater contaminated areas. In contrast, *A. Scholaris* plants showed higher growth, biomass production, tolerance, phytoextraction, and phytoaccumulation rate under household wastewater disposal areas due to the presence of various essential nutrients in them.

Keywords: Phytoremediation, Alstonia scholaris L., Tannery wastewater, Household wastewater, Heavy metals (Cd, Pb, Zn).

Antifungal Activity of Some Fungicides and Plant Extracts for the Control of Chili Anthracnose

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Abstract - Chili (*Capsicum annuum* L.) is the utmost significant cash crop of Pakistan. Annually, about 50 % chili yield is reduced by chili anthracnose disease caused by *Colletotrichum capsici*. The current study was conducted to explore antifungal potential of plant extracts and fungicides against *C. capsici.* Morphological identified strains of *Colletotrichum capsici* were subjected to pathogenicity assay where fungal strain CC-2 showed highly virulent response. Results from *in-vitro* studies revealed that Nativo and Antracol at 1000 ppm and ginger significantly inhibited the mycelial growth and fungal spore germination. From the protective and curative trials, Antracol at 1000 ppm showed highest crop protective activity (92 %) while maximum curative efficacy was shown by Antracol at 1000 ppm (96 %). The results of pot experiments revealed that among the plant extracts, ginger significantly suppressed the *C. capsici* and increased the plant growth while among fungicides,

Antracol was found most effective than Nativo. Biochemical profiling and phytochemical characterization indicated the presence of tannins, phenols, terpenoids, flavonoids, alkaloids, reducing sugars and anthraquinones in Ginger and Cichory extracts. Ginger showed the highest DPPH scavenging activity (64.9 ± 1.85) as compared to cichory (54.6 ± 2.8). GC-MS analysis revealed the presences of various bioactive compounds including Ethanol, Acetone, 2-Butanone, Trichloromethane, 2-Butanone, 4-(4-hydroxy-3-methoxyphenyl)-, Gingerol, 1, 2-Benzenedicarboxylic acid, diisocotyl ester, Hexane, Glycerin, Sucrose, Hexadecanoic acid, methyl ester, 9-Octadecenoic acid (Z)-, methyl ester, 1, 2-Benzenedicarboxylic acid, mono (2-ethylhexyl) ester, n-Hexadecanoic acid, cis-Vaccenic acid, 1-Monolinoleoylglycerol trimethylsilyl ether, and 9,12,15-Octadecatrienoic acid, 2-[(trimethylsilyl)oxy]-1-[[(trimethylsilyl)oxy] methyl]ethyl ester, (Z,Z,Z). FTIR analysis showed 12, 8 and 13 peak values respectively indicating the presence of important functional groups. NMR analysis showed 4 and 7 peak values of ginger and cichory extracts indicating the structures of functional groups. There is need to test the disease suppressive potential of plant extracts under field conditions.

Keywords: Capsicum annuum, Chili Anthracnose, Colletotrichum capsici, GC-MS, FTIR, NMR, Disease control

The Impact of Co-Inoculation with Rhizobacteria and Organic Wastes on Enhancing the Plant Growth and Nutrient Uptake in *Zea mays* L.

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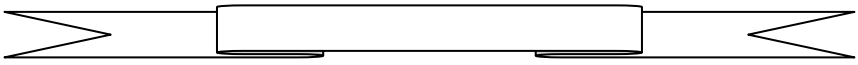
Abstract- *Zea mays* L. is the leading cereal and fodder crop that is used for the production and consumption of food items. Synthetic fertilizers are used in conventional agriculture systems to obtain a high maize crop yield. However, the frequent application of synthetic fertilizers causes deleterious effects on humans as well and excessive utilization of these fertilizers reduces plant nutrient uptake and soil fertility. PGPR together with organic waste could increase nutrient absorption and plant growth parameters. In this research, two rhizobacterial strains, *Bacillus cereus,* and *Pseudomonas putida* were isolated, molecularly characterized, and amplified by using 16S RNA primer and comprised several biochemical tests in which RB-1 strain tested positive for HCN production, Catalase test, Oxidase test, while on the other hand it was tested negative for fluorescent test, (KOH) solubility test, levan production Test, carbohydrate fermentation test, (H_2S) production test as well as for oxidative fermentative test. Similarly, RB-2 strains tested positive for all the tests except carbohydrate fermentation. Both strains were tested positive for IAA production (17.05 – 20.90 mg mL^{-1}), phosphate solubilization (75-81 mg mL^{-1}) as well as for siderophore production (24.53-28.55%). In both strains, RB-1 was identified as *Bacillus cereus* (MG027633.1) while RB-2 was identified as *Pseudomonas putida* (MF462903-1). A seed germination bioassay was performed and both rhizobacterial strains and bacterial consortia (*Sphingobacterium pakistanensis sp., Pantoea sp., Cellulomonas pakistanensis., Citrobacter sp., Exiguobacterium sp., Raoultella sp., Acinetobacter sp., Enterobacter sp., Alcaligenes pakistanensis*) showed positive results compared to control. A pot experiment was executed to investigate the impact of *B. cereus* and *P. putida,* consortia (individually (3mL) and together with organic manure 50% V/V of *CD* (Cow dung) and *VC* (Vermicompost) on enhancing the growth parameters and all treatments showed maximum growth rate, biomass production, chlorophyll a and b, and carotenoid content, growth parameters and nutrient uptake ability in

maize. The results showed that RB-1, RB-2, and consortia with the combination of *CD* and *VC* significantly ($P < 0.05$) increased NPK, Mg, and Fe in shoot and root respectively compared to individual treatments as well as positive and negative control treatments. A new combination of different organic waste manure with PGPR could give tremendously positive results for sustainable agriculture.
Keywords: PGPR, molecular and biochemical characterization, phylogenetic tree, Zea mays, nutrient Uptake, NPK



The Role of Innovative Agricultural Practices in Mitigating the Adverse Effects of Climate Change on Cereal Crops

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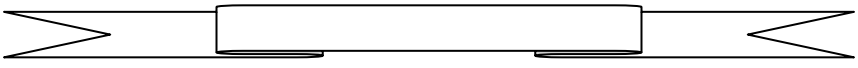
Abstract- Climate change threatens food and nutrition systems worldwide. As greenhouse gas emissions rise, the greenhouse effect raises temperatures. Farmers have suffered from climate-induced extremes including droughts, heat waves, precipitation changes, storms, floods, and new insect pests. Future climate estimates predict a large temperature rise and more severe rainfall occurrences. It is essential to comprehend how new agricultural technologies can combat climate change impact on cereal crops. Innovative technologies must be used to promote sustainable agriculture and resilient production to reduce climate change. Climate change is harmed by artificial fertilizers and insecticides. Therefore, sensible, eco-conscious, and sustainable methods are needed to offset climate-induced harm to agricultural practices. Utilizing early warning systems, decision support systems, enhancing carbon sequestration, and adopting smart technologies, we can effectively alleviate the adverse effects of climate change on

cereal crops. The EWS and AWS systems could help as they offer timely information regarding natural disasters and aid farmers in mitigating damage to ecosystems. Geographic information systems, wireless sensor networks, and mobile technology have the potential to contribute towards addressing the issue of climate change. Using various models can reduce climate-related effects on agricultural production. Biochar and biostimulants are another way that has been identified as viable approaches for mitigating the adverse impacts of climate change on agricultural systems as they can preserve agricultural output and ensure environmental sustainability. Multidisciplinary mitigation methods are essential to assuring agroecosystems' future capacity and minimizing climate change's unexpected effects on agricultural systems.

Keywords: Climatic change; Greenhouse effect; Biochar; Biostimulants; carbon sequestration



Potential of Nanotechnology in Enhancing Crop Yield and Reducing Environmental Impact in Sustainable Agriculture

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Abstract-The promise of nanotechnology to improve food security spans across all areas of agricultural systems, including availability, access, and utilisation. The influence of globalization on rural food availability and use is directly related to the growth in rural incomes. Nanomaterial formulations provide various benefits, including higher effectiveness, better solubility, and induction of systemic action, improved mobility, and lower toxicity. Because of its tiny size, nanotechnology is critical for monitoring agricultural

operations. Nanotechnology has a number of benefits, including increased food quality and safety, lower agricultural inputs, and greater soil nutrient absorption. Nanotechnology improves seed capacity as crop seed manufacturing may be a time-consuming process. Bionanosensors for polluting pollen detection help in early identification and subsequent reduction. Nanotechnology also has the potential to improve agriculture and the food business by developing revolutionary nanotools for disease diagnosis and nutrient absorption in plants. Agriculture's long-term development is dependent on novel methods such as nanotechnology. Implementing modern innovations in the food business is critical for addressing the present crisis. Nanotechnology has emerged as a viable food supply chain technology, with unique features and advantages. Crop production, the use of nanofertilizers, nanopesticides, and nanoherbicides, precision farming methods, intelligent feed, food texture and quality improvement, enhanced bioavailability and nutritional values, and sophisticated packaging and labeling are all part of it. This review looks at the issues surrounding agriculture, food, and natural resources, such as sustainability, sensitivity, human health, and well-being. It goes on to discuss current challenges such as sustainability, food security, and climate change in connection to nanotechnology's function in agriculture.

Keywords: Nanotechnology; Bionanosensors; Nanotools; Nanofertilizers; Nanopesticides, Nanoherbicides, Precision farming

Whole-Genome Sequencing of Medicinally Important *Artemisia scoparia* (Astaraceae)

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Abstract- A new era of "Herb genomics" has started gaining attention with the innovations in sequencing technologies but very few studies are reported regarding whole genomes of medicinal plants. Here we present the genome of diploid *Artemisia scoparia* Waldst. & Kit (Red stem wormwood), belonging to subgenus *Dracunculus* (Besser) Rydb. of the medicinally renowned genus *Artemisia* L. (Asteraceae). The current study tends to increase genomic resources for non-model plants and resolve longstanding disparities existing in the complex systematics of the genus (which could be explained by morphological/molecular uniformity, rapid radiation, hybridization, multiple polyploidy, and incomplete lineage sorting processes); particularly at the species level. This genome complexity of *Artemisia* limits the use of traditional barcode genes, chloroplast genomes, and Sanger sequencing for systematics and evolution studies of *Artemisia*. Here we have used Illumina High-resolution technology producing 150 bp paired-end short reads. Furthermore, we assembled it de novo using Velvet de novo assembler. Mapping to the indexed reference genome was performed using BWA tool; Variant calling was performed through freebayes and mutational hotspots were observed to develop effective markers. The genome analysis predicted a total genome length of >1580000000 bp - 1775628477 bp, N50 of 2407 bp, 36 GC %, containing 1 variant every 8bp. Most variations are observed in intergenic regions. This *A. scoparia* genome will represent the first step toward a reference whole genome assembly for *Artemisia* from Pakistan. Moreover, the accomplishment of whole-genome data will highly support basic and applied research on these medicinal entities offering a creation for researching the complex synthetic pathways of secondary metabolites, genetic diversity, and plant genome evolution. However, short-read data is itself a problem and requires the use of novel approaches to overcome it. Furthermore, lack of funding, low computer resources

and insufficient expertise make it more difficult to sequence whole genomes of plants from low and middle-income countries.

Keywords: Wheat, Heat stress; Nanotechnology; Silver nanoparticles; Climate change

Isolation and Screening of Bacteria for Their Role in Oil Recovery and Metal Tolerance from Petroleum Reservoirs

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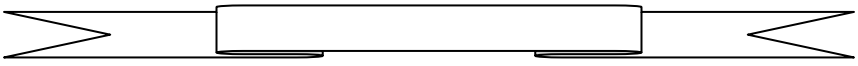
Abstract- Demand of energy and production of oil is becoming less and experiencing decline in many parts of the World. Some factors are included by which oil production is declining. From these factors, one is the increasing population growth. Therefore, there is a need to find out an alternative ways to recover oil from existing oil fields. Bacterial activities playing important role in oil reservoirs since long time but our knowledge regarding nature and diversity of bacteria is still poor, and their metabolic phenomena is largely ignored. Microbial Enhanced Oil Recovery (MEOR) is a useful process to increase oil recovery from a reservoir after primary and secondary recovery operations using organisms and their metabolites. This study was conducted to isolate bacteria from deep oil reservoirs, to explore their crude oil utilizing potential and to determine the impact of metals on microflora. A total of 52 bacterial strains were isolated and analyzed for assessing their crude oil utilizing ability by biotransformation analysis. These isolates were also tested for their salt tolerance estimation to play role in bioremediation. GC MS analysis was done to get their fatty acid profile confirming the presence of biosurfactants that helps in lowering the viscosity and surface tension of crude oil. All of the isolated strains were further assessed for their capability to utilize

crude oil. Out of which 33 were found to possess this ability. There were about 8 isolates that were found to be promising candidates in terms of crude oil utilization exhibiting growth at 8% concentration. These crude oil utilizing isolates were also tested for their potential to tolerate high concentration chromium chloride, showing the same 8 isolates growth at 180mg/L.The study demonstrated that these isolates were promising candidates for enhanced recovery of oil and the unexplored potential of deep oil reservoir microflora should be explored.

Keywords: Microflora, enhanced oil recovery, metal tolerance, biotransformation, GC MS



CHEMISTRY

Doped NMC 811 as Efficient Cathode Materials for Lithium ion Batteries.

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Abstract-The pristine NMC 811 ($LiNi_{0.8}Mn_{0.1}Co_{0.1}O_2$) and the doped (La and Y) $LiNi_{0.8-x}Co_{0.1}Mn_{0.1}O_2$ (x = 0.01, 0.1and 0.2) materials were synthesized through CHFS. This work reports an effective approach (doping) to stabilize the structure of NMC 811 materials. XRD analysis explained the heat treatment at 850 ºC for 12 h using 3X (1.6 g / 2 g NMC powder) lithium concentration as the optimized conditions for the most stable structure. Moreover, the introduction of La^{3+} and Y^{3+} into the structure has remarkably improved the structural and cycling stability of the cathode material. The effect of dopant on the structural and electrochemical properties of the material was studied *via* a number of techniques such as XRD, EDX, SEM, CV and charge/discharge studies. The pure NMC 811 material showed a very low discharge capacity (~130 mAh g^{-1}) that decreased rapidly due to structural deterioration, unexpected side reactions and cation mixing. However, increasing the dopant's amount in the cathode material delivered higher discharge capacities along with enhanced cycling stabilities. The discharge capacities exhibited by the dopants were in the order: 2 % La^{3+} (170 mAh g^{-1}) > 0.1 % Y^{3+} (135 mAh g^{-1}). Importantly, La^{3+} was electrochemically active and enhanced the electrochemical performance by minimizing the electrode polarization and improving the Li ion diffusion pathways. Contrary to this, Y^{3+} doped NMC materials showed less discharge capacities. Here, the opposite effect is ascribed to the electrochemically inert nature of Y^{3+}, improving only the stability of the material. In broad terms, dopants played their role in improving the performance, dependent upon their structural

effects. It is expected that this work will provide a general approach to improve the electrochemical properties of cathode materials for Li-ion batteries.

Keywords: Cathode materials, Li-ion batteries, Doping, Continuous Hydrothermal Flow Synthesis (CHFS), charge/discharge capacities.

Electrochemical Performance of Carbon Modified $LiNiPO_4$ as Li-Ion Battery Cathode: A Combined Experimental and Theoretical Study

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Abstract-This study demonstrates the synthesis of olivine $LiNiPO_4$, and carbon modified $LiNiPO_4$ (LNP/C-composites) cathode materials for use in lithium-ion batteries (LIBs) synthesized via non-aqueous sol-gel process. The LNP/C-composites were fabricated through high energy ball-milling of LiNiPO4 with different weight ratios of conductive carbon black. The electrochemical performance of LiNiPO4 has been considerably improved by modifying the material with conductive carbon black which enhanced cathode performance as thoroughly studied by electrochemical analysis. Discharge capacities of LNP/C-composite cathodes with 25 wt% carbon were 175 mAh g^{-1}, 150 mAh g^{-1} and 125 mAh g^{-1} with corresponding capacity retention of 82.7%, 84.1% and 82.2% after 100 cycles at 0.05C, 0.1C and 1C rates, respectively. High-temperature electrochemical impedance spectra corresponds to decreased charge transfer resistance with increased electronic

conductivity and minimum cell polarization for the LNP/C powders. Additionally, the inflow of lithium-ion flux in cathode particle was simulated by using phase-field modeling indicating the coexistence of Li-poor and Li-rich phases during charging and discharging processes. The findings are significant for the development of optimal battery electrode materials as the methodology and insights used are readily transferable to other ion insertion-based electrodes.

Keywords: $LiNiPO_4$, sol-gel process, LNP/C-composites, High-temperature electrochemical impedance, electrode materials, lithium-ion batteries (LIBs)

Generation of Molecular Imprinted Polymer based Artificial Receptor for the Detection of Organochlorine Pesticides.

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Abstract-Pesticides are used to protect the crops from pests, insects and fungi. Pesticides increase the crop yield, but they also degrade the quality of food. The excessive use of fertilizers and pesticides cause biomagnifications when they enter in the food chain. Organochlorine compounds (OC) impose significant strains on public health, environmental/food safety and homeland security, once they have been widely used as pesticides and insecticides, also display potential to be employed as chemical warfare agents by terrorists. Molecular Imprinted Polymer Based Artificial sensor were designed for the generation of highly selective receptors for Lindane. Two polymer systems i.e. acrylate and polystyrene were screened out to achieve optimal sensitivity and selectivity. Artificially designed receptors were coated onto the transducer (IDEs) and change in conductance was measured by LCR meter. IDE coated by thin layer of receptors were exposed to various

concentrations of template ranging from 0-50 ppm, by using these concentrations change in signal response was recorded. At 0 ppm, conductance (Cs) measured was 0 and as for 10, 20, 30, 40 and 50 ppm, conductance was 29.966nF, 43.27nF, 67.22nF, 84.47nF and 107.21nF. sensors showed concentration dependent linear response towards their respective template molecules. When responses of polystyrene system against Lindane was compared with response of Acrylate system it was revealed that response of Acrylate system was greater than polystyrene system the limit of detection of polyacrylate based lindane sensor was 230 ppb whereas the limit of detection of polystyrene based sensor was 293ppb. Acrylate system-based composites were synthesized to check the response of the sensor the addition of graphene oxide enhanced the surface area that leads to increase the sensitivity of sensor. The sensor was characterized by using Fourier-transform infrared spectroscopy (FTIR). Furthermore, sensor response of these MIPs based sensors were investigated in the presence of competing agents/interfering analytes i.e. atrazine, thiophanate and fipronil to assess the selectivity behavior of fabricated sensors. Each sensor responded to its template molecules only in the presence of other interfering molecules with same geometrical shape which indicate that sensors are highly selective.

Keywords: Interdigital Electrode (IDE), Sensitivity, Selectivity and Specificity etc.

Haematite-loaded Rice Husk Biochar Nanosorbent to remove Chromium from the Aqueous Media

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Abstract-In this study, the biochar of rice husk was modified to a nanosorbent upon loading with haematite for Cr (III) removal from aqueous solutions. Three adsorbents, rice husk, rice husk biochar and haematite-loaded rice husk biochar, were used for equilibrium adsorption studies. SEM and FTIR analysis revealed the presence of pores and various surface active sites on a nanomaterial, which were responsible for the adsorption of Cr (III). C–H, –O–H, C=O stretching vibrations were observed in characterised FTIR peaks. Modelling of adsorption isotherms indicated best fit for Freundlich isotherm with maximum Kf value of 12,218 and 39.5 for linear and non-linear nanomaterial experimental calculations, and positive n value in range of 1–10 for all forms of adsorbents, Dubinin–Radushkevich adsorption saturation capacity qs showed high readings of 9417 and 76.8 for haematite nanomaterial, Elovich isotherm favoured non linear results in case of nanomaterial with increased Qm values 43.4–112.3 from raw form to nanosorbents and Temkin isotherm with. Kinetic and Thermodynamic results were also summarised. Constants k and h and Qe capacity were tabulated for Pseudo second order model with highest Qe in the range of 20.36–22.52 for haematite loaded biochar nanomaterial. Hence, haematite-based rice husk biochar nanostructure was employed as an efficient adsorbent for uptake of chromium.
Keywords: toxic pollutants, biochar, adsorption

Synthesis, and in Silico Guided Biological Evaluation of Triazole- azomethine Conjugates

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Abstract-Triazoles are five membered aromatic heterocycles capable of binding macromolecules, associated with enhanced biological potential, and extended synthetic utility. In this regard, the convenient synthesis, *in vitro* DNA-interaction studies, anti-oxidant assay, and antibacterial evaluation of triazole-azomethine hybrids are presented. Accordingly, the synthesized compounds 3(a-i) were subjected to computational analysis, and Density functional theory (DFT) guided experimental DNA-interaction studies, *in vitro* DPPH free radical quenching, as well as bacterial inhibition assays. Consequently, in DNA-interaction studies, the screened compounds 3(b), 3(c), and 3(g) displayed better DNA binding potential, with ability to fit in the grooves of DNA, and their subsequent DNA-interaction strengths were found to be in the range of 3.7-6.7 x 10^3 M^{-1}. DFT guided UV-Vis spectroscopy based anti-oxidant assay revealed potent oxidative nature of the screened compounds 3(a), 3(c), 3(e), 3(f), and 3(i). DPPH free radical scavenging ability in terms of IC_{50} values falls within a narrow range of 22-34 μM against 50 μM DPPH solution for the tested compounds depicting their significant free radical scavenging potential. *In vitro* screening against gram positive and gram negative bacterial strains were performed for the synthesized compounds 3(a-i), indicating their inhibitory potential in terms of mean zone of inhibition (ZOI). Briefly, the screened compound 3(f) displayed ZOI (21 mm) significantly higher than the control followed by compounds 3(a), 3(d), 3(h), and 3(e), with potency comparable to the reference against *Pseudomonas aeruginosa*. Conversely, the screened compounds 3(a-i), displayed varied response against *Staphylococcus aureus* with highest ZOI (16 mm) by compound 3(c) followed by compounds 3(d), 3(e), 3(h), 3(f), and 3(a).

Keywords: Antibacterial; Anti-oxidant, DNA-Interaction; Molecular Docking; Schiff bases: Triazoles.

Synthesis, *in vitro* a-glucosidase Inhibitory Potential and Molecular Docking Study of Thiadiazole Analogs

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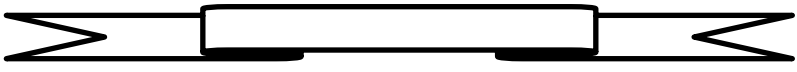
Abstract-α-Glucosidase is a catabolic enzyme that regulates the body's plasma glucose levels by providing energy sources to maintain healthy functioning. 2-Amino-thiadiazole (1–13) and 2-amino-thiadiazole based Schiff bases (14–22) were synthesized, characterized by 1H NMR and HREI-MS and screened for α-glucosidase inhibitory activity. All twenty-two (22) analogs exhibit varied degree of a-glucosidase inhibitory potential with IC50 values ranging between 2.30 ± 0.1 to 38.30 ± 0.7 µM, when compare with standard drug acarbose having IC50 value of 39.60 ± 0.70 µM. Among the series eight derivatives 1, 2, 6, 7, 14, 17, 19 and 20 showed outstanding a-glucosidase inhibitory potential with IC50 values of 3.30 ± 0.1, 5.80 ± 0.2, 2.30 ± 0.1, 2.70 ± 0.1, 2.30 ± 0.1, 5.50 ± 0.1, 4.70 ± 0.2, and 5.50 ± 0.2 µM respectively, which is many fold better than the standard drug acarbose. The remaining analogs showed good to excellent α-glucosidase inhibition. Structure activity relationship has been established for all compounds. The binding interactions of these compounds were confirmed through molecular docking.

Key words: Synthesis, Thiadiazole, a-Glucosidase, Molecular docking study, SAR



Autosomal Recessive Transmission of a Rare HOXC13 Variant Causes Pure Hair and Nail Ectodermal Dysplasia

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Abstract-Fully mature hair and nails differ greatly in physical appearance but share common signaling events at the embryonic level during development and morphogenesis. Abnormalities in any crucial component of these signaling cascades can lead to either isolated hair and nail disorders or associated phenotypes such as pure hair and nail ectodermal dysplasia (PHNED). To find out the genetic factors behind severe form of Ectodermal Dysplasia in Pakistani family. For the current study, we recruited large kindred with multiply affected individuals from a remote area of Pakistan. Approval for the study was obtained from the institutional review board of Quaid-i-Azam University, Islamabad, Pakistan, and written informed consent was obtained from all the available family participants. Haplotypes were constructed by typing microsatellite markers, which revealed linkage to chromosome 12q13.

Sequence analysis of HOXC13 revealed that all affected individuals were homozygous for a novel nonsense variant (c.265C>T, p.Gln89*). To date, only five sequence variants in the HOXC13 gene causing PHNED have been reported. The presence of the mutated genes and the polymorphic nature of the variant (c.265C>T, p.Gln89*), detected in our family were excluded from a panel of 150 unrelated ethnically matched control individuals. In conclusion, we report a novel nonsense variant (c.265C>T, p.Gln89*) in the HOXC13 gene, which resulted in a premature termination codon and is predicted either to produce a truncated protein without an essential DNA binding homeodomain or more likely to undergo nonsense-mediated RNA decay ultimately producing the PHNED phenotype. These findings expand the

spectrum of mutations related to the HOXC13 gene, which results in the PHNED phenotype.

Keywords: Rare variant, HOXC13, Pure hair and nail ectodermal dysplasia, autosomal recessive disorder

Fabrication of Magnetic and Non-magnetic Fe-doped Metal Sulphide for Environmental Protection.

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Abstract-A series of Fe doped metal sulphides nanoparticles i.e, 5% Fe doped CuS, 5% Fe doped ZnS, FeS/CuS (1:1) and FeS/ZnS (1:1) were prepared by simple chemical reactions. Solvothermal method was used for the formation of these nanoparticles and ethylenediamine and water were used as solvent. These nanoparticles were used as catalyst for the degradation of methylene blue dye. FeS/CuS (1:1) showed best degradation of methylene blue dye among all prepared nanoparticles. Effect of concentration of catalyst and temperature were also studied in this project.

Keywords: Doped Solvothermal method Nanoparticles Catalyst and Degradation

Cs4FeBiBr10: An Example of a New-Type A4BB′X10 Lead-Free Metal Halide Perovskite Single Crystal

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Abstract-Lead-free perovskites are a class of promising optoelectronic materials that emerged recently as a nontoxic and stable alternative to lead halide perovskites. Herein, we report the growth and properties of a Cs4FeBiBr10 single crystal, an example of a new-type A4BB′X10 lead-free metal halide perovskite. High-quality single crystals were grown by a solution temperature-lowering method, and a needle shaped crystal with dimensions up to 4 mm × 1 mm × 1 mm was obtained. The black colored product crystallized in orthorhombic symmetry with Pnma space group as analyzed by single crystal XRD. The existence of Bi octahedra and Fe tetrahedra in the crystal lattice indicates the unique feature of the A4BB′X10 perovskite. The Cs4FeBiBr10 single crystals absorb light across the UV–visible region with an optical band gap of 1.62 eV. Temperature-dependent photoluminescence measurements indicate that the Cs4FeBiBr10 single crystals show photoluminescence emission over a wide range of the spectrum covering UV, green, and red regions. The discovery of the new-type A4BB′X10 family enriches the categories of lead-free perovskites and provides more choices of optically active materials for optoelectronic applications.

Key words: Lead-free, Perovskites, optoelectronics, hydrothermal, Single Crystal

PHYSICS

Characterization of $BiMnO_3$ for Multiferroic Applications

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Abstract- $BiMnO_3$ (BMO) has been extensively investigated because it is one of the rare multiferroics that possesses both ferromagnetism (FM) and ferroelectricity (FE). In this research work, BiMnO3 has been prepared using the Co-precipitation method. The analysis of x-ray diffraction indicates that the sample shows a multiphase structure. The surface morphology was observed by scanning electron microscopy (SEM). The paramagnetic behavior of BiMnO3 have been examined by using vibrating sample magnetometer. The prepared sample have prospective application as a multiferroic material.

Key Words: co-precipitation, multiferroic, Nano-rod

Numerical Investigations on Feasibility of Inorganic $KSnBr_3$ Perovskite Absorber for Solar Cells

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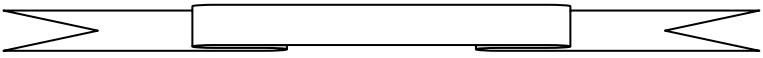
Abstract: A solar cell capacitance simulator was used to simulate a novel, lead-free inorganic perovskite solar cell, specifically $KSnBr_3$ solar cell. The purpose of simulation is to analyze the output characteristics of novel inorganic $KSnBr_3$ solar cell under 1.5 illumination by using solar cell capacitance simulator (SCAPS-1D). Metal halide has emerged as highly promising materials for serving

as the light harvesting components in optoelectronic and photovoltaic devices. Furthermore, the central motivation of this research work is to investigate the impact of defect density in absorber layer, impact of acceptor concentration, and the thickness of solar cell device to understand their effect on the solar cell device performance by using SCAPS-1D. This research work is focused on exploring the properties of novel inorganic absorber material $KSnBr_3$ to investigate its structural, transport, and optical properties of material to determine their potential use for clean energy application. A theoretical study was conducted on the perovskite solar cell based on $FASnI_3$ and $KSnBr_3$ with SCAPS-1D simulation tool. The study focused on utilizing $KSnBr_3$ as a light harvesting layer while various hole transport layers and electrons transport layers were used to identify the most effective structure of solar cell. $KSnBr_3$ holds significant potential in solar cell technology applications due to its remarkable combination of high stability and efficiency. The photon absorption behavior of $KSnBr_3$ demonstrate its ability to absorb a broad range of electro magmatic radiation wavelength from ultraviolet (UV) to infrared (IR) region. Perovskite solar cells (PSCs) has garnered marvelous attention day by day for scientific community due to increasing its power conversion efficiency. The main objective of this research work is to explore effective methods for enhancing the efficiency of tin-based perovskite solar cells by applying a range of organic and inorganic hole transport material for their utilization as photovoltaic materials. In the proposed Au-$CuSbS_2$-$MASnI_3$-$KSnBr_3$-TiO_2-AZO solar cell configuration the optimized thickness values of electron transport layer TiO_2 is 0.010 µm, $CuSbS_2$ used as a hole transport layer (HTL=0.100µm) ($KSnBr_3$=0.010 µm with a bandgap of 2.27eV used as a absorber layer have provided power conversion efficiency (PCE) of 22.36%, current density 31.40 mA/cm^2, open circuit voltage0.992V and fill Factorof ~79.8%, was investigated. The focus of research paper is to propose an envirmental friendly, lead-

free perovskite solar cell and to establish a renewable energy source for industrialization and growing populations. Simulation was performed to study the effect of temperature on the performance of solar cell in the range of 270K-280K.The reported $KSnBr_3$-based perovskite solar cell will help the experimentalist to synthesize the desired material with the most efficient device architecture.

Keywords: Optoelectronic, Photovoltaic, Perovskites, mSolar cells, SCAPS-1D



Synthesis and Structural Study of ZnO with Nano-rod like Surface Morphology

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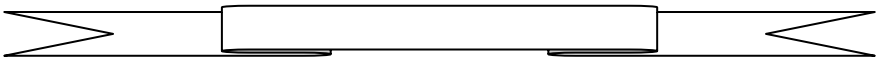
Abstract- A series of $Zn_{1-x}Mn_xO$ nano-rods were fabricated by co-precipitation method using $ZnCl_2$, NaOH and $MnCl_2$ as precursors and distilled water as solvent in order to form the material having both magnetic and semiconducting properties called the Diluted Magnetic Semiconductors (DMS). XRD and SEM were used in order to determine the crystal structure and the surface morphologies. In XRD patterns the single phase of the $Zn_{1-x}Mn_xO$ was evident due to an exact match with the JCPDS card no. 36-1451. Any additional peak is not visible in all XRD patterns which show the successful fabrication of single phase $Zn_{1-x}Mn_xO$. SEM images showed that Nano-rods structure on surface of $Zn_{1-x}Mn_xO$, for all compositions with approximately the same average Nano-rod size.

Key Words: *Co-precipitation, Diluted Magnetic Semiconductors, Nano-rod.*



Designing Spray Pyrolysis Set-up for Fabrication of Thin Film

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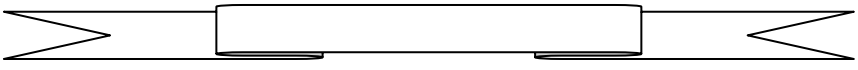
Abstract- Thin film deposition is the process of creating coatings on a substrate material. Consumer electronics, semiconductor lasers, and other solid-state and medical gadgets and products all benefit from thin film deposition for developing functional circuitry. The spray pyrolysis technique is used for the deposition of a thin film. To achieve this goal, a spray pyrolysis setup is manufactured. Required elements for this setup are atomizer, pump, hot plate and material solutions to be deposited on the substrate. The temperature of the hot plate is calibrated with the REX-C700 temperature controller. After calibrating and optimizing pressure, all the active components are housed in an acrylic chamber. The optimum ranges of the parameters are defined to get a uniform and equally distributed film. The resulting film is analyzed by taking into account the dependence on various parameters.

Keywords: Spray, Pyrolysis, ThinFilm, Equipment, Decomposition, precursor.



Performance Evaluation of ITO/TiO_2/$CH_3NH_3SnI_3$/NiO/Au Perovskite Solar Cell

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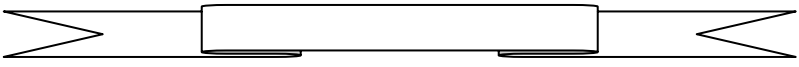
Abstract- The performance of $CH_3NH_3SnI_3$ based perovskite solar cell has been extensively analyzed using the solar cell capacitance

simulator SCAPS-1D. The proposed configuration of the cell is ITO/TiO_2/$CH_3NH_3SnI_3$/NiO/Au. The study focused on examining the quantum efficiency, IV characteristics, and the impact of temperature on these characteristics of solar cell. To enhance the output of the solar cell, the energy band gaps of all the layers were carefully adjusted. An anti-reflective and transparent electrode, Indium Tin Oxide (ITO) with a work function of 4.62 eV was made front contact, and gold (Au) contacts with a work function of 5.1 eV was made back electrode. The absorber layer was set to a thickness of 1.03 µm. TiO_2 and NiO were selected as electron transport layer (ETL) and hole transport layer (HTL) respectively. While investigating the temperature effects on the device performance within a range of 260K to 340K, it was observed that device performance decreased at higher temperatures. A decrease in open circuit voltage and current was observed with increasing temperature. This is due to increased charge carrier generation and collisions with lattice phonons. Through optimization efforts, the solar cell achieved impressive metrics with a fill factor (FF) of 78.5310% and a power conversion efficiency (PCE) of 21.0726%. A significant increase in total current density was observed at an open circuit voltage of 0.84V. The study also explored carrier generation and recombination rates, revealing the highest generation rate at 1.05 µm. However, as the carrier's diffusion length increased, so did the recombination rate, potentially impacting the overall performance of the cell. Quantum efficiency (QE) analysis demonstrated the solar cell's effective conversion of incident photons across the UV and visible range, with high QE values ranging from approximately 96% to 99%. The corresponding photon energy values spanned from 1.69 eV to 3.17 eV.

Keywords: Solar cells, SCAPS 1D, perovskites, simulation, electron & hole transport layer.



Implementation of Arduino based Data Logging System in Industries

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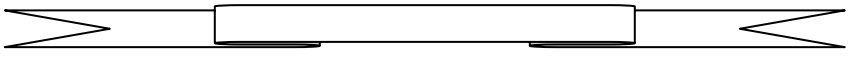
Abstract- A low-cost Arduino based Data logging system is presented here for the industries sensing applications. The system uses Arduino Uno board to sense the data from different sensors and can also read the voltage and current value. This data is then directly entered into the excel sheet using the application software PLX DAQ. It can also be directly interfaced with MATLAB and generate graphical data which can then be further used for processing and analyzing. In industries where various sensors need to calibrate for different purposes utilize data logger that are highly expensive so it actually presents the cost-effective data logger system which can be easily installed and calibrated. This environment friendly arduino based data logging system can also help to increase the efficiency of the system by auto generating graphical presentation of the sensor parameters that need to evaluate for any desired task.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, data, data-logger



Smart Car Parking System

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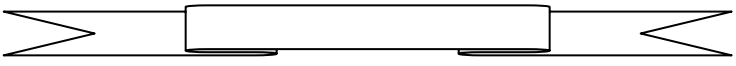
Abstract- Now a days locating a free parking slot is a major problem. Using the Car Parking guard drivers can easily spot a free slot. This optimization leads to increased turnover and better space

utilization. Imagine a busy urban parking slot with multiple parking spaces and high demand for parking. The parking lot management has decided to install a car parking system using IR sensors to streamline parking operations and improve the overall parking experience.

The smart car parking system is used to monitor and signalize the state of availability of single parking space. Our project car parking system uses an LED, IR sensor, resistors, transistor, Buzzer, battery, servo motor, breadboard and jumping wires. Two IR sensors are used at the entry and exit gate to detect vehicle entry and other IR sensors are used to detect the parking slots availability. The servo motor is placed at the entry and exit gate that is used to open and close the gate. The LCD is placed at the entrance which is used to show the availability of parking slots in the parking area. When a vehicle arrives at the gate of the parking area, LCD continuously shows the number of empty slots. If there have any empty slots then the system opens the entry gate by the servo motor. After entering the car into the parking area, when it will occupy a slot, then the LCD shows this slot is full. If there is no empty parking slot then the system displays all slots are full and do not open the gate.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, IR-sensors



Bluetooth Controlled Robot

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Abstract- In this project, we will learn how to make Wireless Bluetooth Controlled Robot Car Using Arduino. The robotic car can

be controlled wirelessly via Smartphone. The smartphone has an Android app through which the user can send commands directly to Robot. The robot can move forward, backward, left, and right and can also be stopped. The Arduino's bluetooth-controlled robot car is interfaced with a bluetooth module HC-05. We can give specific commands to the robot through an android app installed on the phone. At the receiving side, a Bluetooth transceiver module receives the commands and forwards them to the Arduino, and thus the robotic car is controlled. The connection between the android app and the vehicle is facilitated with Bluetooth technology. The range of Bluetooth module is about 70 meters to the robot. The android controlling system provides a good interactive GUI that makes it easy for the user to control the vehicle. The receiver end reads these commands and interprets them in controlling the robotic vehicle. After receiving the commands, arduino then operates the motors and order to move the vehicle in directed directions. It can be implemented as low range Mobile Surveillance Devices. It can be used in conjunction with wheelchairs to aid impaired people. It can be used to transport and store tiny items. It can also be used in restaurants for delivering food to customers. It has various applications in industries as well.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, transmit, receiver, Bluetooth

Smart Stick for Blind People

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Abstract- From the survey of WHO, 39 million people are blind all over the world. It is a quite miserable statement. The people who are

suffering from these visual difficulties can use this project to overcome their situations. The ultrasonic sensor used in this project plays a vital role. It detects the object in front of this within a certain range. When an object is detected, a buzzer sound is given to the user as an indication. While they hear this sound, they can know an obstacle is in front of them. The inability to perceive objects around oneself is the most disastrous things that could happen to a person. This also enhances the ability of the person to move around by themselves in known localities and environments. Over the span of the last decade, several types of devices have been designed to help the visually impaired move around in different kinds of environments. However, these systems haven't proved to be efficient in all scenarios. This project aims to develop an obstacle detection stick that helps the visually impaired in the form of a mobility aid. The designed model detects the closest obstacle using the ultrasonic sensor and in turn generates feedback that alerts the user about the object. For blind people, it is a new method to resolve their problems. A less complex, portable, cost efficient, easy to manage and an effective system is proposed to provide support for the blind. The system will be very easy to find the distance between the objects and the sensor. It can detect the objects in front of the blind person. Without the help of others, the Blind person can move from one place to other and lead their regular lives independently.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, blind, disabled

Bidirectional Visitor Counter

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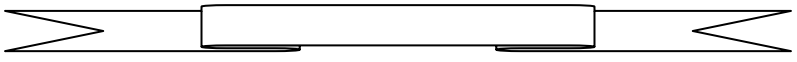
Abstract- This project can be used to count the number of person enter or leaves. Bidirectional means it works in two ways: counter

will be incremented if a person enters, and counter will be decremented if the person leaves. The circuit works on the principle of IR sensing. Infrared or simply IR Sensors are devices that work with Infrared Light Source and a Photo detector like a Photo Diode or a Photo Transistor that act as a Transmitter and Receiver respectively. In this project, we have used an IR LED as the IR Transmitter and a Photo Diode as the IR Receiver. Two sets of IR sensors consisting of an IR LED and Photodiode are placed at two ends of the room. Output from each sensor is fed to the microcontroller. In normal operation, IR light from the LED fall on the Photodiode as it is a Reflective type IR Sensor. The output from the sensor would be a logic LOW signal in this case. IN case of any interruption (due to any person crossing the path), the Photodiode would stop receiving the IR Light and start conducting. As a result, the output from the sensor would be a logic HIGH signal. The transition from low to high, for each sensor pair is detected by the microcontroller and accordingly the count would be increased or decreased. The number of visitors enter, exit and present inside are then displayed on 16x2 LCD. It can be used for security purposes and count the number of persons entering or exiting an offices, hall, shopping mall etc.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, transistor, photodiode



Line Follower Robot

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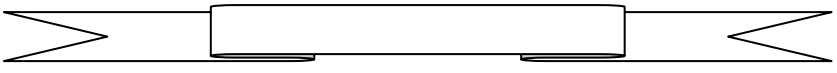
Abstract- Most of the robots are constructed using the help of micro controllers. These make the robot efficient with the cost of

difficulties of understanding. For these reasons, this intelligent line tracking robot is developed with a simple concept of digital ICs. This robot is a mobile device that detects and follows the line track on the floor. The path must be in a visible black line on a white surface. The sensor senses the line by the difference of contrast of the floor. Then it sends a corresponding signal to the arduino. This signal is processed, and it decides which of the wheels will rotate. The difference of the speed of the wheels makes the robot to follow the line. Here we are using two sensors for path detection purposes. That is proximity sensor used and IR sensor. These sensors are mounted at the front end of the robot. The microcontroller is an intelligent device so the whole circuit is controlled by the microcontroller. The line following robot is one of the self-operating robots that detects and follows a line drawn on the area. The line is indicated by a white line on a black surface or black line on a white surface. This system must sense the given track. This line follower robot has many applications in industries as well.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, track, robot



Home Automation using Bluetooth Module (HC05)

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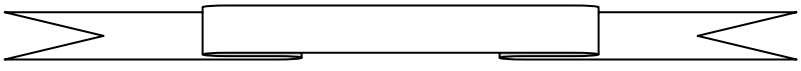
Abstract- This era has been deemed as the technological era and by that we mean the advancement which is taking the world towards automation. Computers are the leading source of this advancement as they confine themselves as the brain of other technologies. Each advancement in machinery, software and equipment has a sole purpose to free human hands from labor work and help them in

exploring more of which is unknown to them. Each technological advancement is made keeping in mind the ease it will provide and benefit it will give towards making human life easy; advancement in home automation is a fine example of technological advancement. Home automation is a very beneficial and empowering project which focuses on providing intelligent switching of appliances restricting power wastage. A central system providing an overview to its user at times not only provides a simple way to monitor one's appliances in use but also open endless possibilities and aspects such as improved security systems, better handling of one's belongings, better use of available resources, easy maintenance of previous records, easy micromanagements etc.

In the current project, I have designed an intelligent home automation system using bluetooth module HC05, Arduino UNO, Relays and other devices. Such a system will lead to automation providing ease to its user. A person would be able to turn on/off his appliances with the leisure of not moving an inch from his/her current location. The future life of mankind shall be defined by such projects.

Keywords: Home automation, Bluetooth HC05, Arduino UNO



Blood Oxygen and Heart Rate Monitoring System

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Abstract- The use of technology in healthcare is growing in importance as a result of the tendency to acquire chronic diseases like heart attack and high blood pressure. Heart rate and blood oxygen saturation are a couple of biometrics that is monitored in this project to provide information regarding the health of the body. By

measuring the intensity change of light transmitted through tissue due to arterial blood the heart rate is measured. Furthermore, oxygenated blood has different light absorption characteristics than deoxygenated blood under red and infrared wavelengths. Comparing the absorptions produces an estimate of the oxygen saturation of the blood. The purpose is to examine how the heart rate and the oxygen saturation of the subject are measured from the finger by the pulse oximetery sensor and then processed by arduino and displayed on 16x2 LCD. The design is small in size, easy to use, and allows a non-invasive, real-time method to provide information regarding health. This enables an efficient and economical means of managing health care. Pulse oximetery is a simple and non-invasive way to measure blood oxygen levels and heart rate. These measurements can be used to help monitor general health and quickly assess people with lung and heart disorders. It can be implemented in university dispensary to assess how well a new lung medication is working, to evaluate whether someone needs help breathing, to evaluate how helpful a ventilator is, to monitor oxygen levels during or after surgical procedures that require sedation and use at home to measure the heart rate and oxygen rate in blood.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, blood, oxygen

Wireless Notice Board

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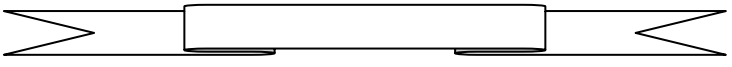
Abstract- The proposed method consists of an electronic notice board that is controlled by an android device and displays messages on it. Traditionally, there were notice boards where any information or notice had to be stuck daily. This becomes tedious and requires

daily maintenance. The project overcame this problem by introducing an electronic wireless display notice board interfaced to an android device through Bluetooth connectivity. The Bluetooth receives the message from the android device that is sent to an Arduino board. Notice boards play a vital role in any institution/organization or public utility places like bus stations, railway stations and parks. But sticking to various notices day-to-day is a difficult process. The Notice board is a common display for effective mode of providing information to the people, but this is not easy for updating the messages instantly. This project deals about an advanced Hi-Tech wireless notice board. This system is enhanced to display the latest information through an Android application of smart phones or tablet. Wireless electronic noticeboards can be customized to suit the needs of each university or college. They can display a variety of information, such as class schedules, campus events, and emergency alerts. This is particularly important for emergency alerts, such as weather warnings or campus closures. This is very useful in hotels, malls, colleges, offices and can be used anywhere, even at home. Like you can set the message like “Do not disturb” at your hostel's room gate, can set message at your home's doorstep when you are away, and of course it is used as notice board in schools, colleges, cinema halls etc.

Keywords: Arduino, solid-state, sensors, interfacing, calibration, notice, wireless, communication



Contribution of the Generalized (r, q) Distributed Electrons in the Formation of Nonlinear ion Acoustic Waves in Upper Ionospheric Plasmas

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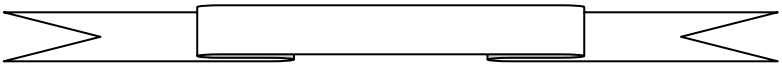
Abstract- The properties of ion-acoustic solitary and periodic structures are studied in magnetized two-ion component (O+ − H+ − e) plasmas with (r, q) distributed electrons. Two modes of ion-acoustic waves, namely, fast, and slow modes, can propagate in such a plasma. The nonlinear Zakharov–Kuznetsov equation is derived using the well-known reductive perturbation method. Employing the theory of planar dynamical systems, the system under consideration is found to admit compressive (hump) and rarefactive (dip) solitary structures and periodic wave solutions. The behavior of propagation of nonlinear ion-acoustic solitary structures is found to be different for fast and slow modes owing to the difference in physics of the two modes. The effect of the double spectral indices r and q is thoroughly explored. It is shown that altering the shape of the distribution function through these indices radically alters the propagation characteristics of nonlinear ion acoustic waves. The concentration ratio of heavy (O+) to light ions (H+) is found to change the fast mode, whereas the temperature ratio is observed to alter the slow mode. We have applied our study to the upper ionosphere where bi-ion plasmas and the presence of non-Maxwellian electrons have been observed by various satellite missions.
Key Words: non-Maxwellian, propagation, perturbation method



A Novel and Diverse Pest Detection and Classification system using Deep Learning Techniques

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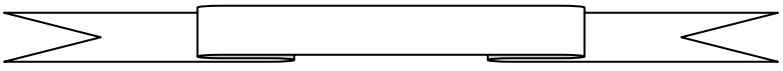
Abstract-The agricultural sector faces significant challenges due to the adverse effects of various pest attacks on critical field crops like rice,

wheat, maize, soybean, and sugarcane. The reduction in crop production caused by insect infestations necessitates innovative solutions for pest monitoring and classification. This study addresses the issue by combining multiple state of the art insect datasets to create a diverse and comprehensive dataset. Various deep learning convolutional neural network (CNN) models, including ResNet, MobileNet, VGG16, VGG19 and others, are implemented to detect these pests and then various classifiers like Decision Tree Classifier, Random Forest Classifier and Support Vector Machine are used to classify the pests. The proposed approach outperforms existing models, achieving an impressive classification accuracy of 99.82% using the Support Vector Machine classifier. Furthermore, consistent performance in terms of precision, sensitivity, and specificity has been observed using the proposed technique. This research has wide-ranging pest detection, promising solution for protection and enhanced crop yields in agriculture.

Keywords: pest classification, pest detection, deep learning, diverse pest classification dataset



Quantum Walks with Bipartite Entangled Coins

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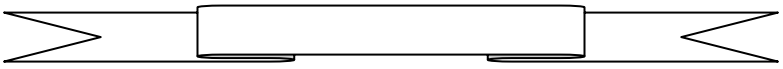
Abstract-The Quantum Walk is the quantum version of classical random walk. In a conventional "Discrete-time Quantum Walk (DTQW)", coin and shift unitary operators guide the evolution of the walker after some steps. While the direction of motion is determined by the coin operator, the shift operator displaces the walker's position by one or more-unit steps to the right or left. I have highlighted the important measures to inquire the degree of entanglement in discrete and bipartite systems. Entanglement of particles is a predominant aspect of quantum mechanical systems and is the most contradictory with classical intuitions. The use of entanglement as a resource is explored in the computational tool of quantum walks wherein entanglement in the coin states enhances the probability

distribution of the walker to far off positions. This is exploited to devise quantum algorithms that are much fast paced as compared to their classical counterparts. Applications include secure quantum key distribution in cryptography, super-dense coding, teleportation, etc. and the most striking implementation in quantum computers which make use of entangled bits as data registers for faster processing of information.

Keywords: Quantum Walk, Entanglement



ZOOLOGY

Study of a Genetic Variation among Patients of Breast Cancer in a Pakistani Population

Bushra Ghazanfar[1*], Ruqia Mehmood Baig[1], Muhammad Irfan[1], & Aayesha Riaz[1]

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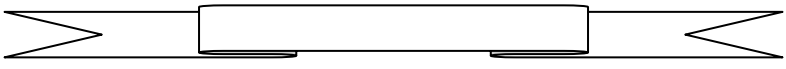
Abstract-Over the past few decades, the prevalence of breast cancer has been rising substantially in Asian countries, including Pakistan. Studies have shown an increase in breast cancer cases, depicting changes in lifestyle, reproductive factors, and healthcare infrastructure. Breast cancer is now the most frequently diagnosed cancer in Pakistani women, causing a significant rise in overall cancer cases. Globally, 7.8 million living women had breast cancer by the end of 2020, and around 9.6 million cancer patients died in 2018 alone, making cancer one of the leading causes of human mortality. 1 out of every 9 women is associated with breast cancer in Pakistan. PIK3CA genes are amplified in most human cancers thus PIK3CA acts as an oncogene in humans. Therefore, this research aimed to investigate the role of PIK3CA mutations in breast cancer in Pakistan. The study was based in Pakistan and was conducted after approval from ethical committee of UAAR and respective hospitals. Sampling of breast tumors was done from Rawalpindi and Islamabad. The DNA of the respective samples was extracted and used for further laboratory processing. The detection of oncogenic PIK3CA mutation in the study sample was carried out by Sanger's sequencing. DNA of all the cancer patients was extracted in the laboratory and screened for mutation (SNP rs2677760). The epidemiological data confirmed the findings about the prevalence of breast cancer. The demographic data showed that more married females (89%) were diseased than unmarried women (11%). Similarly, breast cancer was more prevalent in patients who were lactating mothers in the study cohort. As far the menopausal

status is concerned, 64% of the patients under study were premenopausal whereas the remaining (36%) were postmenopausal. Invasive ductal carcinoma represented the majority with an incidence rate of 25.81% (age range 35-60 years). Invasive mammary carcinoma (age range 55-70 years) and ductal carcinoma in-situ (age range 40-64 years) represented 6.5% of the cohort while 3.2% (45 years) of the patients had invasive lobular carcinoma. Highest cases of female breast cancer were observed in the age group of 45-55 years and the least common instances were observed in age group above 70 years. The present study affirms the status of breast cancer as a multifactorial disease and its positive correlation with established risk factors such as age of patient, age at menarche, menopausal status, family-history of breast cancer, and poor financial condition. The sequencing results demonstrate that 68% of the study cohort had mutation in both alleles and 16% of the patients were heterozygous for the studied SNP implying that PIK3CA mutation has a role in breast cancer carcinogenesis in Pakistani population as well. However, further studies with large sample size and effective statistical power are required to validate the results of the study.



Effect of Hyperglycemia on Renal Function

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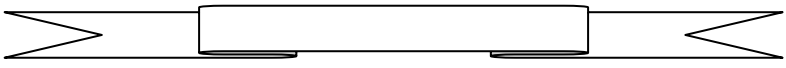
Abstract-Hyperglycemia is a condition of high blood glucose levels that results when the body has too little insulin or when the body cannot use insulin properly. Human kidneys help the body to excrete waste products such as urine. Kidney secretes enzymes like creatinine, urea, and uric acid.

The current study was carried out to check the influence of hyperglycemia on the serum creatinine, urea and uric acid level. Diabetic patients (N = 46) were selected from a hospital. Glucose levels were measured along with detailed history of the patients. Serum was separated from the blood of the patients. The serum was used for carrying out renal function tests including creatinine, urea and uric acid using commercially available kits. The correlation between glucose, creatinine, urea and uric acid was statistically estimated. Results showed elevated levels of uric acid were observed in 56.52%, patients while 15.21 % patients with elevated creatinine levels were reported. While uric acid and creatinine levels were in the upper range in some of the patients but were not significantly high. The uric acid was positively correlated with creatinine with r value (0.422) and p value < (0.01). Urea was positively correlated with creatinine with the r value 0.821and (p value< 0.0001). Some of the patients had urea and creatinine in higher but within accepted ranges. Selected diabetic patients did not show any symptoms of damage to renal function.



Mechanism of Narcotic Addictions and Innovative Treatment by Injectable hydrogel for Sustained Release of Antinarcotic Drugs

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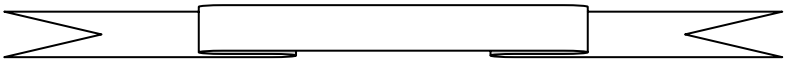
Abstract-Narcotics such as opioids, cannabis, alcohol, heroin, and methamphetamine act on the brain's reward center through a variety of mechanisms to increase the dopamine level and provide euphoria.

This narcotics-induced addiction can be treated with medicinal herbs as well as synthetic antinarcotics by designing Injectable hydrogels with sustained release properties. A series of Chitosan-co-Carbomer (CS-co-CR) based hydrogel (crosslinked with carbohydrazide) were prepared followed by incorporation of antinarcotic drug in interpenetrated network (IPN) of hydrogel. The characterization of prepared hydrogel performed by Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), and differential scanning calorimetry (DSC) revealed the structural, morphological and sol-gel transition properties. The swelling, biodegradation, drug loading and stability analysis were performed in the pH range of 6.5-7.5 due to pKa of chitosan and carbomer respectively. Antibacterial and cytotoxity assays were performed for the safety evaluation of injectable hydrogel via *in-vitro and in-vivo*. The results revealed 88% of antinarcotic-drug release for two months in a sustained manner at physiological pH. The results suggested that the addiction and relapse induced by abusive substances could be overcome by a single dose injection for up to two months.



Effect of COVID-19 on Fisheries and Aquaculture Industry in Pakistan and the Mitigation Measures

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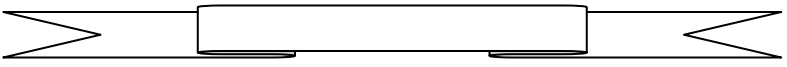
Abstract-Fisheries in Pakistan as a subsector of agriculture, plays an important role in the national economy and towards food security of the country by reducing pressure on demand for mutton, beef, and poultry. It is also considered to be an important source of livelihood for the coastal population. Besides marine fishery, inland fishery

(based in rivers, lakes, dams etc.) is also an important activity throughout the country. Even though COVID-19 does not affect fish, nor is it caused by the consumption of fish, the fisheries and aquaculture sector is still subject to indirect impacts of the pandemic through changing consumer demands, market access or logistical problems related to transportation and border restrictions. The present study was designed to evaluate the effect of COVID-19 on fisheries and aquaculture industry in Pakistan. For this purpose, the data was collected from different stakeholders like government departments (DOF Punjab, MFD, FDB, Pakistan Statistical Bureau, Economic Survey of Pakistan) and fish markets. The production of fish & fishery products has witnessed a decrease of 1.5 percent from 2019-2020 to 2020-2021. COVID-19 affected the common households badly with an increases rate of food insecurity about 10% of Pakistani people suffered from severe food insecurity (PBS, 2020) so they were unable to use fish as a food. Transportation delays or cancellations have hampered the timely supply and application of farm inputs. Many progressive farmers could not stock Pangasius fish and shrimp (*Penaeus vannamei*) due to unavailability of seed and PL-12 owing to border restrictions. In conclusion, COVID-19 affected each and every pillar of fisheries and aquaculture industry, from production to consumption, there must be some remedial approach to mitigate the devastating effects.



Potential of Poultry by-product Meal as a Fishmeal Alternative in Aquafeed: A Review

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Abstract-The rapid expansion of aquaculture sector, short supply of fish meal (FM) and its high demand as a protein source in feed formulations have convinced the researchers to investigate different FM alternatives. Among FM alternatives, animal protein sources are preferred over plant protein sources due to having high protein content, energy content, good digestibility properties and less anti-nutritional factors. Out of these sources, poultry by-product meal (PBM) has been used widely in aquafeed. It has been derived from the rendered parts of poultry carcass such as head, neck, feet, intestine, gizzard and undeveloped eggs. It has well-balanced nutritional profile of protein, lipid, essential amino acids, good palatability, high digestibility, cost-effectiveness and wider availability. This review aimed to summarize the effects of PBM on growth performance, nutrient digestibility, gut health and liver in different fish species. The hematological, biochemical parameters, whole-body composition, body indices, amino acid composition, fatty acid composition and gene expression of fish fed PBM-based diet are also assessed. Finally, the methods to improve the quality of PBM were also reviewed. It is hoped that this review will provide strong evidence to support the claim that PBM is a potential candidate for FM replacement in fish feed.
Keywords: Feed formulation, poultry carcass, palatability, nutrient digestibility, anti-nutritional factors

Monitoring Insecticide Resistance and Associated Fitness Cost in Field Evolved Resistant Population of *Plutella Xylostella* an Overview of Pakistan

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Abstract-Diamondback moth larvae feed on almost every member of cruciferous incurring about USD 4–5 billion in monetary deficit

annually. Chemical control is the preferred measure in the field against insect pests due to its quick and easy utility and multiple pest situations. In Pakistan, we are facing insecticide resistance evolution in different insect pests. In the current study, resistance status of ten different insecticides from various groups was evaluated against field collected populations. All the four tested populations had developed an extremely high level of resistance against leufenuron, lambda-cyhalothrin, profenophos, and chlorantraniliprole having >160-fold resistance compared to Arid-PK reference population. Moderate to high level of resistance against spintoram, pyrifluquinazon and mixture of thiamethoxam+ chlorantraniliprole. No resistance was observed against *Bacillus thuringiensis* and emamectin benzoate. Insecticide resistance occurs due to genetic mutation at a single or multiple loci thereby imparting negative impacts on life table of resistant insect. Decrease in Net Reproductive rate (R0) egg/individual, Gross Reproductive Rate and Mean Generation Time (T) was observed in field collected individuals as compared to susceptible strain.Recent study revealed that resistant population of *Plutella xylostella* also observed shorter larval duration 9.68 days as compared to 11.03 days for susceptible population while female longitivity was also shorter 13.41 days and 15.05 days in respective populations. This study provides a recent insight into resistance evolution in *P. xylostella* field populations. Keeping in view the current findings, best management practices can be opted for successful management of this pest.

Keywords: Resistance, Fitness cost, Management, *P. xylostella*

First record of *Podagrion pachymerum* (Walker 1833) (Hymenoptera: Torymidae) from Pakistan

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Abstract-*Podagrion pachymerum* (Walker 1833) (Hymenoptera) belongs to parasitoid wasp family Torymidae which is distinguished due to its role as agricultural pests or bio-control agents in many ecosystems. The genus *Podagrion* is distributed all over the world and is reported so far only from oothecae of praying mantids (Mantodea). *Podagrion pachymerum* has been reported as bio-control agent of different mantid species in various parts of the world. This species is reported for the first time from Pakistan. Branches of guava bearing preying mantid oothecae were collected from Orchard of PMAS-AAUR. They were brought to the laboratory and placed in plastic jars covered with muslin cloth. Rearing of these oothecae was done at room laboratory conditions until parasitoid emergence. Emerged parasitoids were identified using recent main taxonomic characters given in the literature. Illustrations of taxonomic characters, relevant measurements and micrographs of mantid oothecae have been given in this study. Distribution range along with host record has also been provided.
Key words:*Podagrion pachymerum*, Hymenoptera, Torymidae, New Record, Pakistan.

Removal of Nickel from Contaminated Water by using Bacterial Biofiltration

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Abstract-Nickel contamination is one of the most significant environmental and health concerns worldwide. Nickel is a heavy metal that is abundant in natural and industrial processes. It accumulates in soil, water and air, leading to adverse ecological and human health effects. Nickel is a hard and ductile transition metal that is found naturally in the earth's crust. Nickel contamination arise from various sources including industrial waste, mining activities and atmospheric deposition. Certain bacteria are metal resistant because they have the ability to interact with and immobilize nickel ions in contaminated water. In this research, contaminated water samples were collected from collected samples. Nickel resistance bacteria were isolated from contaminated industrial sites. Various bacterial strains were analyzed in the laboratory including *Pseudomonas aeruginosa* and *Bacillus cereus* showing that these bacteria had exhibited remarkable efficiency in nickel remediation. Results showed that the segregated bacteria were exceptionally productive in eliminating 85% nickel from contaminated water. In conclusion this research explores the potential of specific bacterial strains to adsorb, accumulate or catalyze the precipitation of nickel ions, thus offering a sustainable and environment friendly approach to mitigate nickel contamination in water sources.

Keywords: Nickel, Contamination, Nickel resistant bacteria, Biofiltration, Immobilize

Protein Variability of the Two Species of Stomatopods from Family Squillidae *Clorida Latreillei* and *Oratosquilla Hesperia* from the Karachi Coast, Pakistan

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Abstract-Stomatopoda, also referred to as mantis shrimps, are predatory malacostracan crustaceans. Stomatpods are typical benthic marine carnivores in tropical and subtropical settings. Their modified second maxillipeds into raptorial claws and tri flagellate antennules set them apart from other malacostracans. Stomatopods use raptorial claws to capture their prey. The current study compares the proteins of two species from two genera of the family Squillidae (*Clorida latreillei* and *Oratosquilla hesperia*), whose taxonomic identification is based on external morphology.The squillid taxon has been regarded as a complex and challenging genus, so the molecular variability between two species of the genus Squillidae (*Clorida latreillei* and *Oratosquilla hesperia*) was also observed by Sodium Dodecyl Sulfate - Polyacrylamide Gel Electrophoresis (SDS-PAGE). The protein SDS-PAGE is a useful technique that does not need expensive or complex equipment to identify species. The two species of generic protein (non-specific) demonstrate a clear variation in their banding patterns, according to the electrophoresis results.

Keywords: Stomatopods, Predatory, Tropical and Subtropical, *Clorida*, *Oratosquilla*

Elasmobranch Species Recorded at Karachi Fish Harbour during The Baseline Surveys (2014-2019): A Review of Several Biological Elements with a few public-Attribute Trends

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Abstract-A variety of 1249 specimens were extensively inspected in the baseline surveys, which took place across four months from March 2014 to May 2019, and included 47 distinct species of main elasmobranch groups. The Karachi Fish Harbour was chosen as the research location for the preliminary surveys, with the sea wáter auction hall and the elasmobranchs laughter house serving as the principal observation stations, and these surveys were carried out on a monthly basis throughout various time periods. Twenty shark species from eight different group shark families, seventeen ray species from seven families, and ten skate species from three families were all present in these specimens and were all subjected to taxonomic classification analysis. Although among the recognized species, some were uncommon species detected just once throughout the survey period, it was found that a few species were the most frequently occurring among the landings at KFH during the baseline surveys.

Keywords: Specimens, baseline surveys, elasmobranchs, Karachi Fish Harbour, taxonomic characterization.

33An Experimental Study on the Diversity of Diatoms with Relation to the Presence of Microplastics from the Sonmiani Bay, Pakistan

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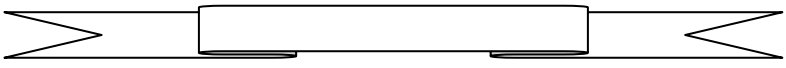
Abstract-Diatoms are single-celled creatures that participate in the process of photosynthesis and have chlorophyll like plants. The most prevalent kind of phytoplankton and significant class of algae are diatoms. They assemble into a network or cluster and float freely in the water. They may be found in lakes, bogs, rivers, and seas. Samples from Pakistan's Sonmiani Bay were taken between high tide and low tide for this study. All of the samples were transferred to the lab after being formalin-preserved. Subsamples of the samples were examined under a microscope to evaluate the variety of diatoms. Moreover, samples were prepared for the assessment of microplastic presence and identification. According to the previous study findings, *Navicula, Chaetoceros,* and in the samples in large quantities. The distribution of microplastics reveals the contamination of threads and beads in Sonmiani Bay's waters. Few species of diatoms showed a strong correlation with the Microplastic abundance.
Keywords: Microplastic, Species, Diatoms,chlorophyll,waters.



Estimation of Air Pollution Associated with Cement Industry

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Abstract-Cement industry, being the major contributor to dust pollution with particulate matter, SO_2, NO_x and VOCs into the atmosphere. These emissions have adverse effects on air quality and human health, making it crucial to seek sustainable solutions for mitigation. Implementing bioremediation in the cement industry can aid in meeting regulatory requirements for emissions reduction, helping plants adhere to environmental standards. In the study,

multiple effects of the dust that the plant faced and neutralized were studied, marking the plants efficiency in cement dust removal. It also involved the study of multiple plant growth parameters to reach sustainable results. Cement dust was collected and characterized by different physicochemical methods. The dust sedimentation rate in the cement production plant was 59.18mg/m^2 per day as highest and 38.73mg/m^2 as lowest. Particle sizes ranged from 0.1 to 6.8 µ in cement mill and kiln area. The structural study revealed that the mass median diameter (MMD) was in the range of 0.1 to around 9.8 microns, indicating their relatively large size for a cement kiln and mill while the shape was similar for the clinker, but the MMD was found to be 8.24-56.76 microns. Microscopy revealed bimodal (irregular and globular) shapes of the dust particles of variable sizes. The dispersal rate of the particulate was around 51% which comprised 10 percent in case of PM2.5 and that for PM10 was around 3%. The data revealed indicates that despite the use of bag filters, the air in the vicinity of cement plants is still heavily polluted with harmful dust particles which need to be cleaned from the air.

Keywords: Cement, Bioremediation, Air quality, Pollution, Dust particles

Bioremediation Potential of Indigenous Bacterial Isolates for the Removal of Chromium from Contaminated Water

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Abstract-Chromium is known to cause health problems such as cancer and other diseases in humans. Chromium has a great concern globally due to its extensive applications in various industrial

processes such as textile, manufacturing of inks, dyes, paints and pigments, electroplating, stainless steel, leather, tanning and wood preservation, among many others. Cr^{+3} in wastewater can be converted into Cr^{+6} when oxidized in the environment. The occurrence of hexavalent Chromium in drinking water resources even in low amount is carcinogenic. Therefore, research on Chromium removal from contaminated water has attracted much attention recently. It is important to remove chromium from water in order to protect both humans and water quality. A number of methods such as biofiltration, biological removal, adsorption and chemical methods have been used. Biofiltration and bioremediation are important and cost-effective methods for removing chromium from water. In this study, Bacteria were isolated from water samples collected from rivers of Punjab and KPK. Non-repetitive pure isolated bacteria were characterized for their metal tolerance (MTC) against chromium. Results indicated that 65% of isolated bacteria were resistant to 100-1500 mg/L concentration of chromium. The efficiency of these bacteria for removal of chromium from water was 79% at concentration of 100-1500 mg/L. We conclude that these selected bacteria can be used for removal of chromium from contaminated water.

Keywords: Chromium, Biofiltration, Bioremediation, Contaminated water, Adsorption

Assessment of *Saccharum Arundinaceum* for its Cytotoxic Potentials

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Abstract- Humans have been suffering from the terrible disease of cancer for a long time, but the way it has been treated has been chaotic,

necessitating a constant search for new treatments. The use of natural substances, which are less hazardous than chemotherapy, has been encouraged by researchers. Natural resources are now being explored in various research studies to find compounds of significant therapeutic potential. *Saccharum arundinaceum* (Poaceae) is commonly known as hardy sugarcane. Traditionally, it is used for the treatment of diarrhea, fever, kidney and urinary tract infections. In this study, the methanolic plant extract was assessed *in vitro* for its cytotoxic activities. Methodology: Brine shrimp cytotoxicity assay was employed to determine cytotoxic activities of plant extract. Results: The methanolic plant extract had a very low cytotoxic effect on Brine shrimps with a mortality rate of 20% after 24 hours while after 48 hours the mortality rate was up to 30%, and 50% of the death rate was noted after 72 hours. Conclusion: Hence, it can be concluded that *S. arundinaceum*has cytotoxic potential which can be exploited further for the isolation of cytotoxic compounds especially for cancer treatment.
Keywords: *Saccharum arundinaceum,* Poaceae, Cancer, Brine shrimp, Sugarcane

Determination of Antibacterial Activities of Methanolic Extract of *Elymus repens*.

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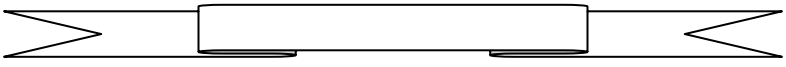
Abstract-Purpose: The endless number of emerging infectious diseases are compelling man to search novel drugs and treatments. For this purpose, man is looking into plants for some new drugs to combat such ailments. *Elymus repens* is a wriggling perennial grass member of the

family Poaceae.In classical medicine, it is consumed as a diuretic and soothes the pain and spasm in the urinary tract. It is also used as an emollient and tonic. It is a popular grass used to treat the condition of urolithiasis (formation of kidney stones). In our study, the antibacterial efficacy of methanolic extract was evaluated. Methodology: In this study, the antibacterial potentials of crude methanolic extract of *E. repens* were determined using agar well diffusion method against four bacterial strains i.e. *Staphylococcus aureus*, *Syphilis epididymitis*, *Escherichia coli* and *Klebsiella pneumoniae*. Results: *E. repens* demonstrated activity against *S. epidermidis, E. coli* and *K. pneumoniae*. Conclusion: The results of this study show the antibacterial potential of *E. repens*. Further investigations can be performed on this plant to isolate different antibacterial compounds for the treatment of infectious diseases.

Keywords: Elymus repens, Antibacterial, Poaceae, Diuretic, Escherichia coli



Health Related Quality of Life among Women with Polycystic Ovarian Syndrome Visiting Tertiary Care Hospitals of Rawalpindi City

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Abstract-Polycystic ovary syndrome (PCOS) is a multi-faredisease caused by both genetic and environmental factors acting concurrently with rising prevalence at an alarming rate. It is a health problem that affects 1 out of 10 women of reproductive age. Infertility, body hairs, menstrual problems, emotional disturbances and weight are main reasons that demonstrate poor quality of life among women. Symptoms of PCOS vary from person to person but generally are infertility due to anovulation, cessation, or irregular

menstrual periods. The objective of the study was to determine the quality of life among women with PCOS visiting tertiary care hospitals Rawalpindi city and to find out an association between quality of life and socio-demographic variables. A cross sectional study was conducted using non probability convenience sampling for patient selection with sample of 134 from tertiary care hospitals of Rawalpindi city. A pre-validated tool PCOSQ was used to measure the quality of life among women with PCOS that consist of 5 domains representing 25 items. Emotions, Body Hairs, Weight, Menstrualproblems, Infertility Problems. After data collection, data was entered and coded in SPSS. For descriptive statistics percentages and frequencies were analyzed. For inferential statistics Chi-square was used. The findings of this study showed total quality of life among PCOS women were 44% had poor quality of life and 56% had good quality of life this showed that PCOS has negative effect on women life. The results of the present study concluded that women with polycystic ovary syndrome had a poor quality of life.
Keywords: Quality of life, polycystic ovary syndrome (PCOS), depression, infertility, weight, body hairs, menstrual problems.

Removal of Lead from Contaminated Agricultural Soil by Using Selected Bacterial Isolates

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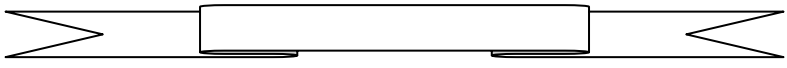
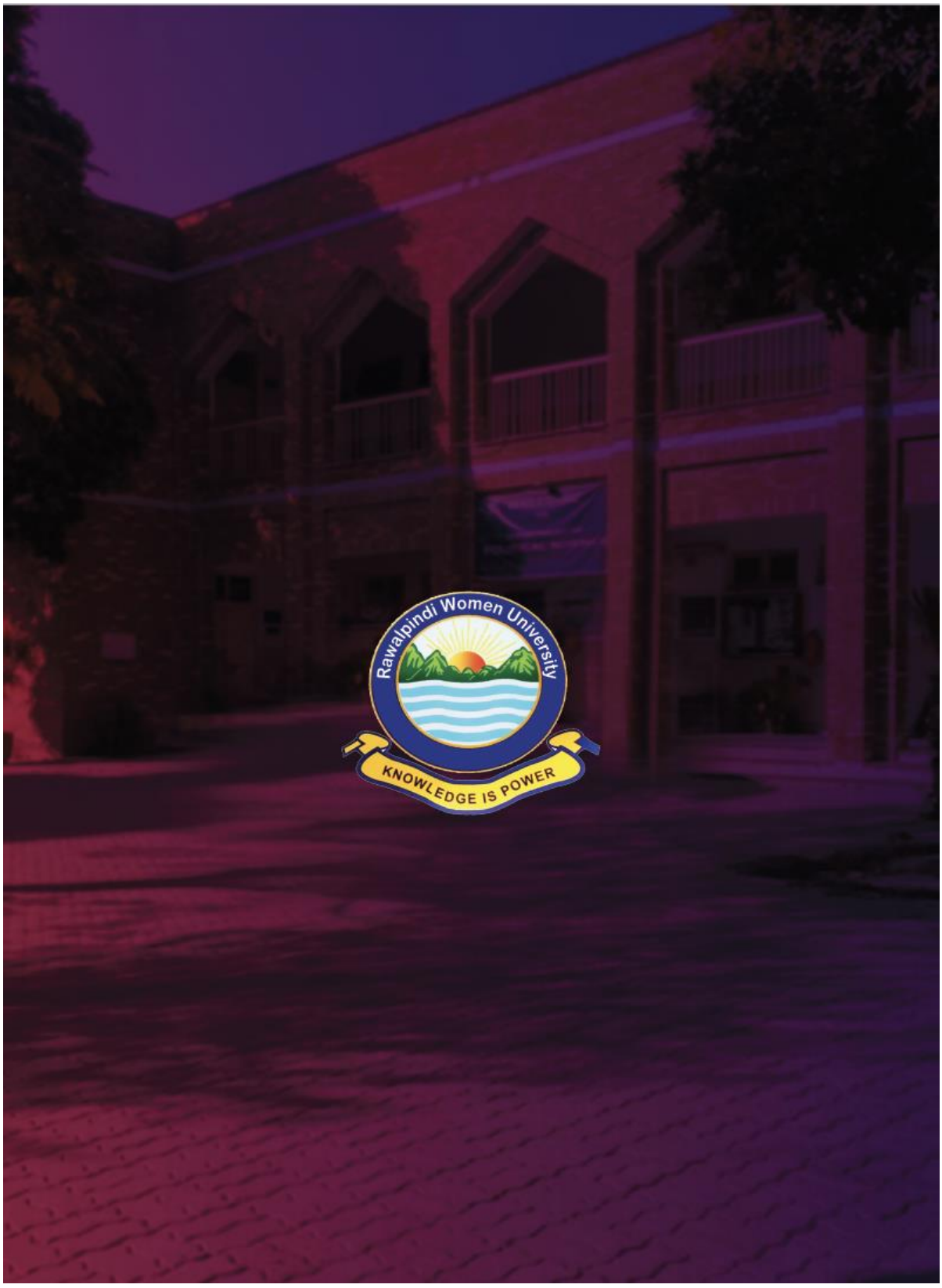
Abstract-The contamination of soil with lead poses a significant environmental and public health risk because of its stability in contaminated sites and the complexity of mechanism in biological toxicity. Lead is a naturally occurring bluish-gray metal available in small amounts in the Earth's crust. Lead contamination of surface

soils has resulted from industrial activities like mining, smelting and lead-based paints. Some of the microorganisms have developed several mechanisms that allow them to survive at high concentrations of Pb. In this study, bacteria resistant to lead were isolated from contaminated industrial sites. A series of laboratory experiments were conducted to check the removal of efficiency of lead by lead-resistant bacteria. Certain bacteria such as *Bacillus cereus, Pseudomonas vesicularis, Arthrobacter* sp. were found effective for lead bioremediation because they can absorb lead from soil and convert the soluble lead into insoluble forms making it less harmful. Results indicated that under optimum conditions, isolated bacteria were able to significantly reduce lead concentration in soil with removal efficiency of 83% at concentrations of 300 mg/L. In conclusion, this research presents a viable and sustainable solution for the removal of lead from contaminated agricultural soil using lead resistant bacteria.

Keywords: Lead, Contamination, Lead resistant bacteria, Bioremediation, Optimum, Viable, Sustainable

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