INTEGRAL UNIVERSITY
LUCKNOW - INDIA

A+ ACCREDITED BY NAAC

RESEARCH COMPENDIUM

2023-24

INSPIRING EXCELLENCE

INTEGRAL UNIVERSITY
इंटीग्रल विश्वविद्यालय
लखनऊ-भारत
LUCKNOW-INDIA

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RESEARCH COMPENDIUM

2023-24

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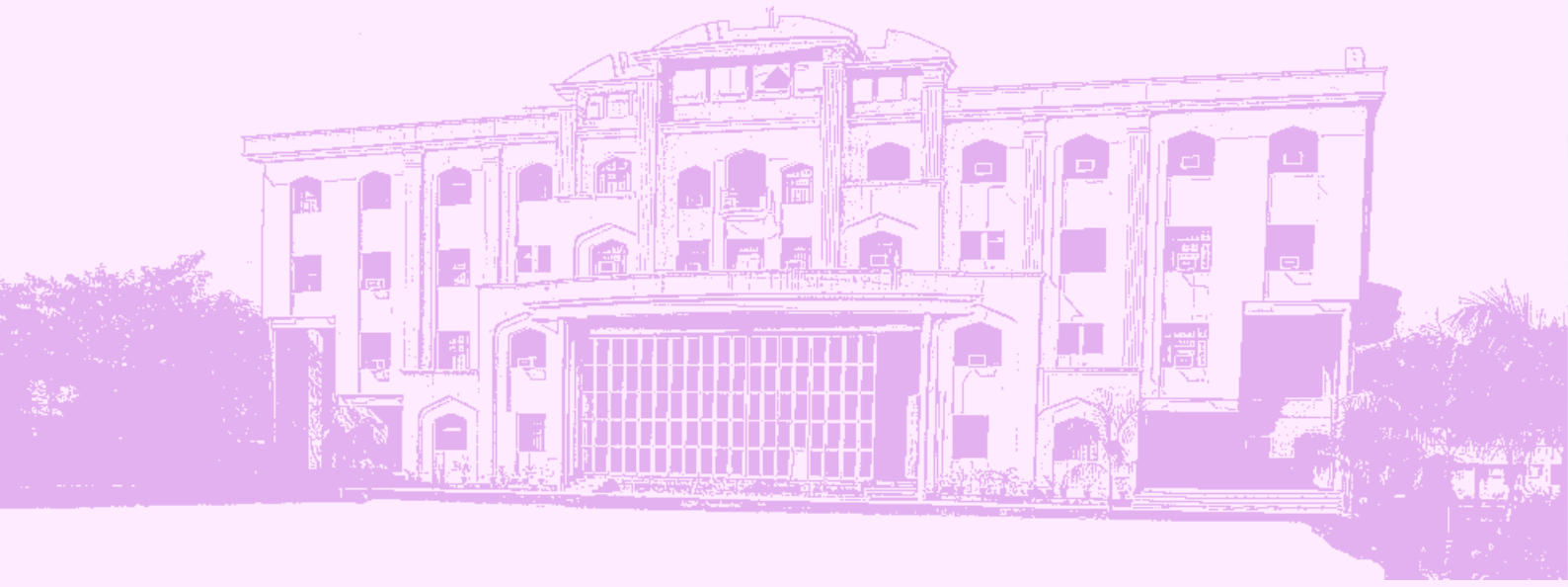


Founder and Chancellor's Message

It gives me immense pride to introduce this compendium, which reflects the remarkable academic achievements of our faculty at Integral University. I extend my heartfelt congratulations to every researcher whose work is represented here and to our esteemed Vice-Chancellor, Professor Javed Musarrat, for his visionary initiative in compiling this resource. His leadership in bringing together the research contributions of our faculty has created a valuable platform that will benefit our entire academic community.

This compendium is more than a catalog of impactful research; it symbolizes our commitment to a culture of collaboration, innovation, and intellectual rigor. Gathering these significant publications gives our faculty a unique opportunity to engage with each other's work, fostering interdisciplinary connections and nurturing a collective spirit of academic inquiry.

The compendium strengthens our internal academic bonds and highlights our achievements to a broader audience. For prospective students, funding bodies, and industrial partners, this document serves as a testament to the quality and relevance of our research. It reinforces our university's role as a center for impactful research and opens doors to new partnerships and collaborations.

Once again, I commend our Vice-Chancellor for his foresight and dedication, and I congratulate each contributor for their hard work and accomplishments. I encourage the entire university community to engage with this compendium and to take inspiration from our shared pursuit of knowledge and progress.

S. N. Akhtar

Prof. Syed Waseem Akhtar
Founder and Chancellor
Integral University

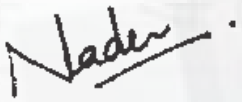
Pro-Chancellor's Message

It is a matter of great pride and fulfillment to introduce this research compendium, a resource that embodies our faculty's dedication and intellectual contributions. I congratulate our esteemed Vice-Chancellor, Professor Javed Musarrat, for his initiative in compiling this compendium, which underscores his commitment to fostering a vibrant research culture at Integral University. His vision has brought this project to fruition, enabling our faculty to understand the university's research landscape comprehensively.

This compendium is a valuable tool for interdepartmental collaboration, providing insights that encourage faculty members to explore new interdisciplinary connections. Highlighting impactful research from across our departments fosters a shared vision and motivates our academic community to strive for further excellence. Such initiatives not only enrich our academic environment but also drive innovation, enhancing our institution's reputation and intellectual depth.

Externally, this compendium testifies to Integral University's high standards of scholarship. It presents a curated showcase of our achievements to funding agencies, industry partners, and academic peers, drawing attention to our research strengths and creating opportunities for meaningful partnerships. Professor Musarrat's efforts in compiling this compendium amplify the university's reputation, demonstrating our commitment to impactful and globally relevant research.

I offer my heartfelt thanks to our Vice-Chancellor and congratulations to each contributor. May this compendium inspire continued collaboration, discovery, and progress within our university community and beyond.



Dr. Syed Nadeem Akhtar
Pro-Chancellor
Integral University

Vice-Chancellor's Message

It is with great pride and pleasure that I present the Research Compendium for the academic year 2023-2024, highlighting the significant contributions of our faculty and researchers in terms of high-quality research publications at Integral University.This compendium is not merely a record of our academic output but a testament to the success of the Integral Research Initiative, introduced in 2021, which has fostered an environment of innovation and inquiry across disciplines. Our commitment to advancing cutting-edge research in Biological Sciences, Chemical and Material Sciences, Environmental Sciences, Pharmacy, Toxicology, Agriculture, Engineering, and Medical Sciences has reached new heights.

The establishment of the Integral Centre of Excellence for Interdisciplinary Research (ICEIR) and the development of our state-of-the-art Central Instrumentation Facility have been pivotal in transforming our research capabilities. Approved by the Academic and Executive Councils in 2023, ICEIR serves as a collaborative nucleus that bridges various academic disciplines, empowering researchers to tackle complex global challenges. I am delighted that our strategic investment in research infrastructure is bearing fruits, and reflected in the high quality of research and innovation emerging from our university.

The quality and impact of our research are evident from the remarkable achievements during the 2023-2024 academic session. Our researchers published 710 research articles, and of these 337 publications appeared in Scopus and Web of Science-indexed journals, and 383 articles were published in UGC-CARE-listed and other journals. Notably, 207 of these appeared in high-impact journals with an impact factor (IF) of 2.0 or higher, signifying the exceptional quality of our work. Furthermore, our innovation efforts resulted in 182 patents filed over the past three years, bringing our cumulative record to 124 published and 58 granted patents. These achievements highlight the creativity, dedication, and relentless pursuit of excellence by our research teams, showcasing the thriving research ecosystem at Integral University

Integral University is at a transformative stage in its journey towards becoming a research-intensive institution. Quality research is the cornerstone of our vision. By fostering a vibrant research culture, we are enhancing our global reputation, paving the way for collaborative partnerships, and unfolding funding opportunities.

I extend my heartfelt congratulations to all our faculty and researchers for their remarkable research contributions, and I am confident that this research compendium will inspire future breakthroughs and innovations, driving Integral University to new heights of academic and scientific excellence.

Prof. Javed Musarrat
Vice Chancellor
Integral University

The Integral Centre of Excellence for Interdisciplinary Research (ICEIR)

About The Research Compendium

The publication of the Research Compendium for the academic year 2023-2024 is a landmark event for Integral University. This comprehensive document highlights the significant research contributions by our faculty and researchers across various departments. It serves as a testament to the hard work, creativity, and dedication of the university's research community.The compendium showcases not only the number of publications but also emphasizes the quality of the research by focusing on articles published in high-impact journals. By documenting and disseminating high-impact research, the compendium enhances the university's visibility within the national and international scientific communities. This increased visibility is crucial for fostering collaborations, attracting funding, and solidifying Integral University's position as a leading institution for research and innovation.

Indeed, the Research Compendium will become an annual feature, serving as a tool for strategic planning and decision-making. By analyzing the research outputs of each academic year, the university can identify emerging trends, allocate resources effectively, and develop targeted initiatives to further enhance research productivity and impact. This will ensure that Integral University continues to build on its research achievements and remains at the forefront of academic and scientific excellence.

Promoting Research Culture and Integrity

Integral University's commitment to research extends beyond infrastructure and publications. A vibrant research culture, characterized by intellectual curiosity, rigorous inquiry, and adherence to ethical standards, is at the heart of the university's research mission. The Integral Centre of Excellence for Interdisciplinary Research (ICEIR) and Central Instrumentation Facility (CIF) have played a crucial role in fostering this culture by encouraging faculty and students to engage in interdisciplinary projects, participate in workshops and seminars, and collaborate with national and international experts.

Research integrity is a fundamental component of the university's approach to research. Adhering to ethical standards, protocols, and policies is essential for maintaining the credibility and trustworthiness of the university's research outputs. To promote this, Integral University hosts various induction programs, workshops, and panel discussions that address best practices in research, highlight areas for improvement, and facilitate open discussions that build trust within research teams.

ICEIR: A Hub for Interdisciplinary Research

Research has always been the backbone of academic excellence and a key driver of innovation and societal progress. At Integral University, we recognize that research is a vehicle for contributing to global knowledge, solving real-world problems, and driving economic development. In line with this vision, the Integral Centre of Excellence for Interdisciplinary Research (ICEIR) was established in 2023. As a pioneering initiative approved by the 30th Academic Council meeting (15-07-2023, Resolution No. 14) and the 40th Executive Council meeting (22-07-2023, Resolution No. 16), ICEIR has become a cornerstone for fostering interdisciplinary collaboration and cutting-edge research across diverse fields.

The establishment of the Integral Centre of Excellence for Interdisciplinary Research (ICEIR) and the development of the Central Instrumentation Facility (CIF) have transformed the research landscape at Integral University. Together, they have significantly enhanced the university's ability to produce high-quality, high-impact research and have positioned the university as a leader in interdisciplinary innovation.

As Integral University continues its transition towards becoming a research-intensive institution, ICEIR and CIF will play a central role in guiding the university's research efforts, inspiring future breakthroughs, and elevating the university's academic standing on the global stage. Through initiatives such as the annual Research Compendium, the university celebrates its research achievements, fosters a culture of excellence, and ensures that its contributions to science, technology, and society will have a lasting and meaningful impact.

The core mission of ICEIR is to unite various academic disciplines under one umbrella, enabling collaborative research efforts that address complex, global challenges. Interdisciplinary research, by its very nature, facilitates innovation by merging different fields of study to approach problems in novel ways. Therefore, ICEIR serves as a central hub where researchers from different departments, viz. biological, chemical and physical sciences, engineering, agriculture, environmental sciences, pharmacy, material sciences, medical and allied health sciences can work together towards a common goal.ICEIR has been designed to promote innovative research that goes beyond conventional academic frameworks. Its focus is on generating high-impact research outcomes that not only contribute to the academic community but also have real-world applications. The center's mission includes fostering a collaborative environment where faculty and students are encouraged to explore new research areas, share their expertise, and work on joint projects.

One of the key objectives of ICEIR is to enhance the number of high-impact research publications produced by the university. The center is dedicated to ensuring that researchers associated with ICEIR publish at least one thousand high-impact papers annually in Q1 and Q2 journals indexed in Scopus and Web of Science. This focus on quality publications elevates the academic profile of the university and contributes to the global scientific community, making ICEIR a beacon of research excellence.

The University's research ecosystem has been further bolstered by developing a state-of-the-art Central Instrumentation Facility (CIF), which supports high-end research with advanced technology and infrastructure. ICEIR and CIF have significantly contributed to improving the quality of research at Integral University, providing an environment where innovation can thrive, and faculty and students can engage in groundbreaking research that transcends traditional academic boundaries.

The Central Instrumentation Facility (CIF): Driving Cutting-Edge Research

Supporting ICEIR's ambitious research agenda is the Central Instrumentation Facility (CIF), which houses advanced analytical equipment essential for high-level research across multiple disciplines. The CIF provides researchers with access to state-of-the-art instruments, including but not limited to sophisticated spectrophotometers, Spectrofluorometers, Gel Documentation systems, advanced microscopy and imaging equipment, Real-time PCR, ICP-MS, LC-MS, etc. vital for conducting cutting-edge research in molecular biology, drug development and design, chemistry, material sciences and nanotechnology, carcinogenesis, pharmaceutical and environmental analysis, neurotoxicology and stem cell research.

The CIF's role extends beyond simply providing equipment. It offers technical support and training to faculty, researchers, and students, ensuring they can operate the equipment efficiently and safely. This not only accelerates research output but also equips researchers with the necessary skills to conduct advanced experiments. Additionally, the CIF facilitates the optimal utilization of resources, encouraging interdisciplinary collaboration by enabling different departments to share research tools and data under the supervision of the Dean, Research and Development, Director, and Deputy Director, ICEIR.

The CIF has been instrumental in driving the quality of research at Integral University. The access to front-line technology has led to more accurate and sophisticated research, allowing faculty and researchers to contribute to high-impact scientific journals. Moreover, the CIF has played a critical role in securing patents and fostering innovation, as many projects that benefit from the CEIR-CIF have resulted in significant intellectual property outcomes.

The Positive Impact on ResearchQuality at Integral University

The impact of ICEIR, supported by CIF, on the quantum and quality of research at Integral University is evident. This compendium highlights only 125 research publications published in the indexed Scopus and Web of Science journals with an impact factor of 3.0 and above, underscoring the university's focus on high-impact research. Information on other research publications and patents is presented graphically in Figures 1 to 2.

During the academic year 2023–2024, Integral University demonstrated remarkable strides in research, scholarly publications, and intellectual property development. University researchers published **710 research articles**, showcasing a commitment to quality, relevance, and impactful contributions across diverse disciplines. Of these, **337 publications** appeared in **Scopus** and **Web of Science-indexed journals**, and **383 articles** were published in **UGC-CARE-listed journals**, reflecting the university's research efforts. The impressive growth in research quality and patent portfolio can be directly attributed to strategic investments in research infrastructure and fostering collaborative opportunities through ICEIR.

The 337 articles published in **high-impact factor journals** reflect the university's focus on contributing to cutting-edge research. The following is a breakdown of these publications based on their Impact Factors (IF):

i. **36 articles** in journals with an **Impact Factor (IF) ≥ 5.0**

ii. **34 articles** in journals with an **Impact Factor (IF) ≥ 4.0**

iii. **55 articles** in journals with an **Impact Factor (IF) ≥ 3.0**

iv. **82 articles** in journals with an **Impact Factor(IF) ≥ 2.0**

v. **120 articles** in journals with an **Impact Factor (IF) ≥ 0.01**

These publications not only underscore the rigor of the university's research but also align with global trends, addressing critical challenges in science, technology, healthcare, social sciences, and humanities.

The university's emphasis on innovation is further reflected in its **patent achievements** for 2023–2024. This year alone, **36 patents** were **published**, and **17 patents** were **granted**, showcasing the university's growing contributions to applied research and technology development.

Cumulative Patent Achievements (Last Three Years):

i. **182 patents filed**

ii. **124 published patents**

iii. **58 granted patents**

The strategic increase in patent filings and grants signals a vibrant research ecosystem, fostering innovation with practical applications. These patents cover diverse fields, including biotechnology, engineering, healthcare, environmental science, and information technology, aiming to solve real-world problems and advance knowledge-based entrepreneurship.

Collaborations and Funding: Expanding the Research Horizon

Another important objective of ICEIR is to secure external grants to support its research initiatives. The center actively pursues funding from government agencies, corporate partners, and international organizations to maintain and upgrade its research facilities. This funding is crucial for sustaining the university's research momentum and ensuring that it remains at the cutting edge of scientific inquiry.

Collaborations with industry leaders, national research institutions, and international academic organizations are another key strategy of ICEIR. These partnerships provide valuable opportunities for knowledge exchange, resource sharing, and expanding networking opportunities, all of which are vital for advancing the center's research agenda. By fostering these collaborations, ICEIR not only enhances the quality of research at Integral University but also ensures that the university's research is aligned with global scientific trends and challenges.

Coordination Chemistry Reviews
Akpan et al., (2024) 499: 215503

Coordination compounds as corrosion inhibitors of metals : A review

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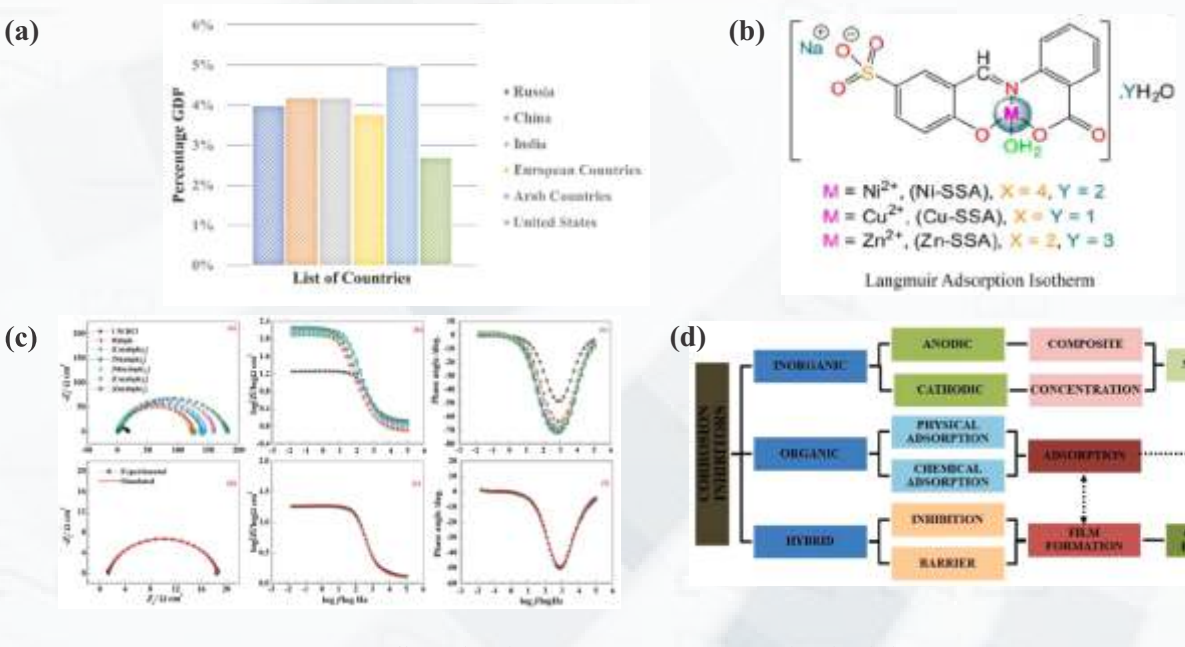
I. F. 20.03

Corrosion is a significant threat that devalues the environment and compromises the lifespan of metallic assets, infrastructures, and industrial installations. Consequently, using chemical inhibitors, particularly coordination compounds as a means of mitigating corrosion holds the potential to extend the lifespan of infrastructures and result in substantial cost savings in terms of equipment, materials and structures. This aspect of studies remains a vital area of research. Coordination compounds used as inhibitors of corrosion and described in this review article include compounds with a metal atom bonded to a carbon atom (organometallic), and molecules having metal-N, metal-S, metal-O and metal-P bonds, respectively. Experimental analyses and theoretical assessments of coordination compounds as corrosion control agents have been reviewed in this article. Established and current approaches in corrosion inhibition using coordination compounds have also been discussed. Data reviewed and presented in this article show that the corrosion inhibition efficacies and adsorption of coordination compounds depend on the ligands and metal centres, the methods used for corrosion studies, the corrodents, metal substrates and other experimental conditions. Additionally, notable knowledge gaps are identified, and future research perspectives are highlighted.



Coordination compounds as corrosion inhibitors

Trends in Food Science & Technology
Dubey et al., (2023) 141:104190

Current scenario and global perspectives of citrus fruit waste as a valuable resource for the development of food packaging film

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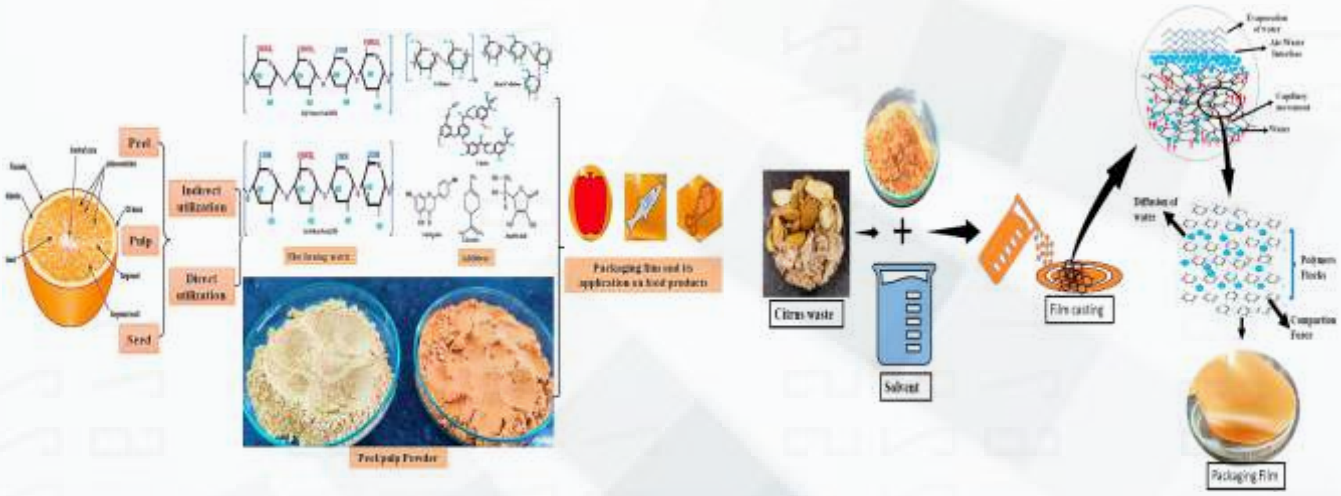
I.F. 15.1

Background : Citrus fruits are the most prevalent fruit crops around the world. The general consumption of citrus fruits and their processing to finished products like juices, jam, and jelly generate a huge amount of waste (peel, pomace, and seeds). This waste has triggered concerns about the environment, health, and economic losses. Conversely, petroleum-based plastics are highly resistant to degradation and sustain in the environment for a prolonged period resulting in easy access of microplastics into human food chain caused majorly due to plastic food packaging. Living organisms can accumulate microplastics in cells and tissues which results in threats of chronic biological effects and potential health hazards for humans.

Scope and approach : For sustainable mitigation, citrus fruit processing wastes (CFPW) is explored as one of the prominent bioresources for biopolymers like pectin, cellulose, hemicellulose, lignin, and bioactive compounds having strong antioxidant and antimicrobial properties. The review provides a comprehensive overview of CFPW utilization for developing biodegradable packaging film for its applicability in food products. The review encompasses both the direct incorporation of citrus peel powder and the secondary utilization of beneficial substances from these residues, mainly pectin, essential oils, and seed extracts.

Key findings and conclusion : This review gives insight into the compounds that support the implication of CFPW in packaging with the concept of circular economy, sustainability, and zero waste. An attempt has been made to reflect the role of various components found in CFPW towards its applicability in food packaging with the strategy of comprehensive utilization in the most suitable way.



Development of food packaging films from citrus fruit waste

Seminars in Cancer Biology
Hasan et al., (2024) 98:31-50

Deregulated transcription factors in the emerging cancer hallmarks

Adria Hasan[a,b], Naushad Ahmad Khan[c], Shahab Uddin[d,e,f,g], Abdul Q. Khan[d,*], Martin Steinhoff[d,f,h,i,j,k]
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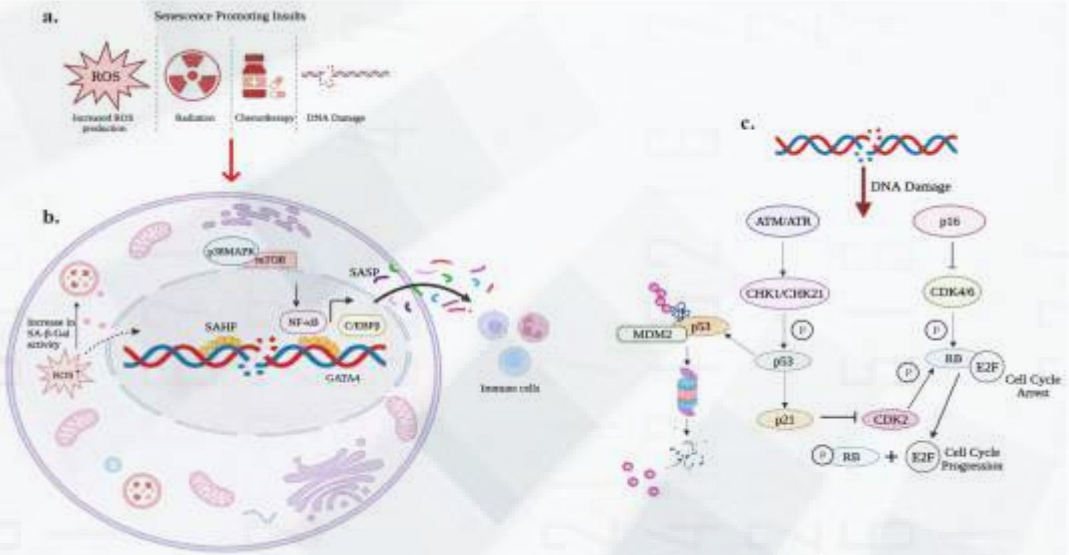
I.F. 12.1

Cancer progression is a multifaceted process that entails several stages and demands the persistent expression or activation of transcription factors (TFs) to facilitate growth and survival. TFs are a cluster of proteins with DNA-binding domains that attach to promoter or enhancer DNA strands to start the transcription of genes by collaborating with RNA polymerase and other supporting proteins. They are generally acknowledged as the major regulatory molecules that coordinate biological homeostasis and the appropriate functioning of cellular components, subsequently contributing to human physiology. TFs proteins are crucial for controlling transcription during the embryonic stage and development, and the stability of different cell types depends on how they function in different cell types. The development and progression of cancer cells and tumors might be triggered by any anomaly in transcription factor function. It has long been acknowledged that cancer development is accompanied by the dysregulated activity of TF alterations which might result in faulty gene expression. Recent studies have suggested that dysregulated transcription factors play a major role in developing various human malignancies by altering and rewiring metabolic processes, modifying the immune response, and triggering oncogenic signaling cascades. This review emphasizes the interplay between TFs involved in metabolic and epigenetic reprogramming, evading immune attacks, cellular senescence, and the maintenance of cancer stemness in cancerous cells. The insights presented herein will facilitate the development of innovative therapeutic modalities to tackle the dysregulated transcription factors underlying cancer.



Role of transcription factors in modulating cellular senescence.

Seminars in Cancer Biology
Khan et al., (2024) 100:1-16

Exploiting transcription factors to target EMT and cancer stem cells for tumor modulation and therapy

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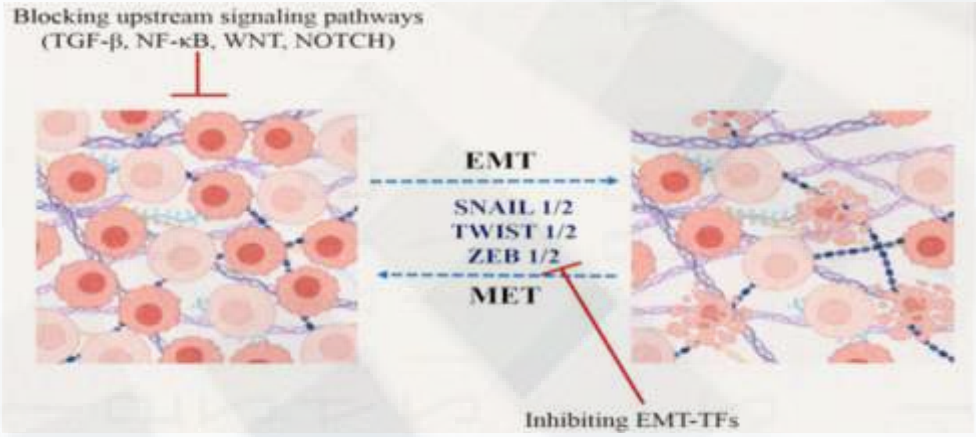
I.F. 12.1

Transcription factors (TFs) are essential in controlling gene regulatory networks that determine cellular fate during embryogenesis and tumor development. TFs are the major players in promoting cancer stemness by regulating the function of cancer stem cells (CSCs). Understanding how TFs interact with their downstream targets for determining cell fate during embryogenesis and tumor development is a critical area of research. CSCs are increasingly recognized for their significance in tumorigenesis and patient prognosis, as they play a significant role in cancer initiation, progression, metastasis, and treatment resistance. However, traditional therapies have limited effectiveness in eliminating this subset of cells, allowing CSCs to persist and potentially form secondary tumors. Recent studies have revealed that cancer cells and tumors with CSC-like features also exhibit genes related to the epithelial-to-mesenchymal transition (EMT). EMT-associated transcription factors (EMT-TFs) like TWIST and Snail/Slug can upregulate EMT-related genes and reprogram cancer cells into a stem-like phenotype. Importantly, the regulation of EMT-TFs, particularly through post-translational modifications (PTMs), plays a significant role in cancer metastasis and the acquisition of stem cell-like features. PTMs, including phosphorylation, ubiquitination, and SUMOylation, can alter the stability, localization, and activity of EMT-TFs, thereby modulating their ability to drive EMT and stemness properties in cancer cells. Although targeting EMT-TFs holds potential in tackling CSCs, current pharmacological approaches to do so directly are unavailable. Therefore, this review aims to explore the role of EMT- and CSC-TFs, their connection and impact in cellular development and cancer, emphasizing the potential of TF networks as targets for therapeutic intervention.



Development of food packaging films from citrus fruit waste

Journal of Experimental & Clinical Cancer Research
Khan et al., (2023) 42(1):221

Exosome nanovesicles as potential biomarkers and immune checkpoint signaling modulators in lung cancer microenvironment : recent advances and emerging concepts

Naushad Ahmad Khan[1,2*], Mohammad Asim[1], Kabir H. Biswas[3], Amani N Alansari[1], Harman Saman[4], Mohammad Zahid Sarwar[2], Kudaibergen Osmonaliev[2] and **Shahab Uddin**[5,6*]

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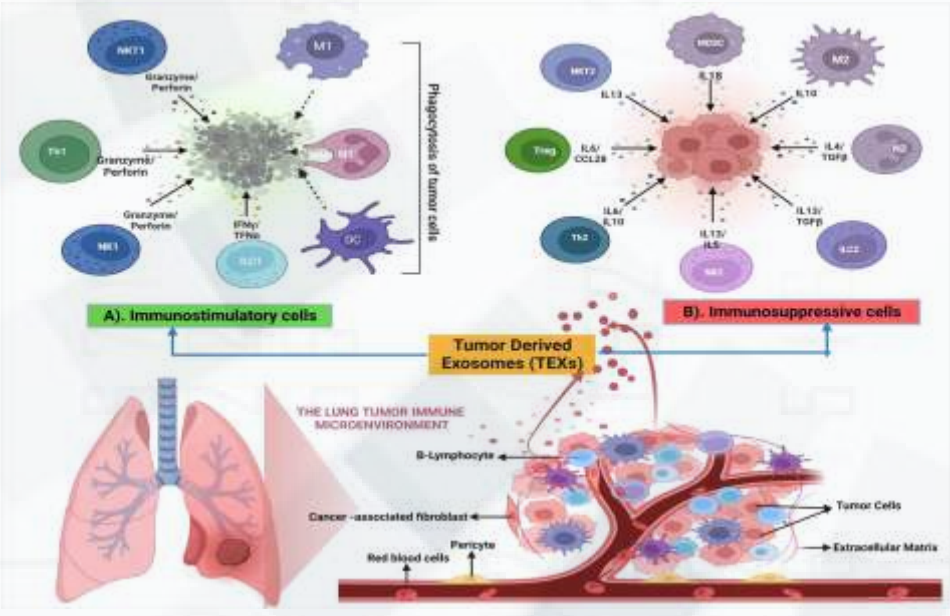
I.F. 11.4

Lung cancer remains the leading cause of cancer-related deaths globally, and the survival rate remains low despite advances in diagnosis and treatment. The progression of lung cancer is a multifaceted and dynamic phenomenon that encompasses interplays among cancerous cells and their microenvironment, which incorporates immune cells. Exosomes, which are small membrane-bound vesicles, are released by numerous cell types in normal and stressful situations to allow communication between cells. Tumor-derived exosomes (TEXs) possess diverse neo-antigens and cargoes such as proteins, RNA, and DNA and have a unique molecular makeup refecting tumor genetic complexity. TEXs contain both immunosuppressive and immunostimulatory factors and may play a role in immunomodulation by infuencing innate and adaptive immune components. Moreover, they transmit signals that contribute to the progression of lung cancer by promoting metastasis, epithelial-mesenchymal transition (EMT), angiogenesis, and immunosuppression. This makes them a valuable resource for investigating the immune environment of tumors, which could pave the way for the development of non-invasive biomarkers that could aid in the prognosis, diagnosis,and immunotherapy of lung cancer. While immune checkpoint inhibitor (ICI) immunotherapy has shown promising results in treating initial-stage cancers, most patients eventually develop adaptive resistance over time. Emerging evidence demonstrates that TEXs could serve as a prognostic biomarker for immunotherapeutic response and have a signifcant impact on both systemic immune suppression and tumor advancement. Therefore, understanding TEXs and their role in lung cancer tumorigenesis and their response to immunotherapies is an exciting research area and needs further investigation. This review highlights the role of TEXs as key contributors to the advancement of lung cancer and their clinical signifcance in lung immune-oncology, including their possible use as biomarkers for monitoring disease progression and prognosis, as well as emerging shreds of evidence regarding the possibility of using exosomes as targets to improve lung cancer therapy.



Tumor-derived exosome (TEX) mediated communication and immunomodulation in the tumor microenvironment

Bioresource Technology Reports
Sharma et al., (2023) 23:101515

Food waste digestate as biofertilizer and their direct applications in agriculture

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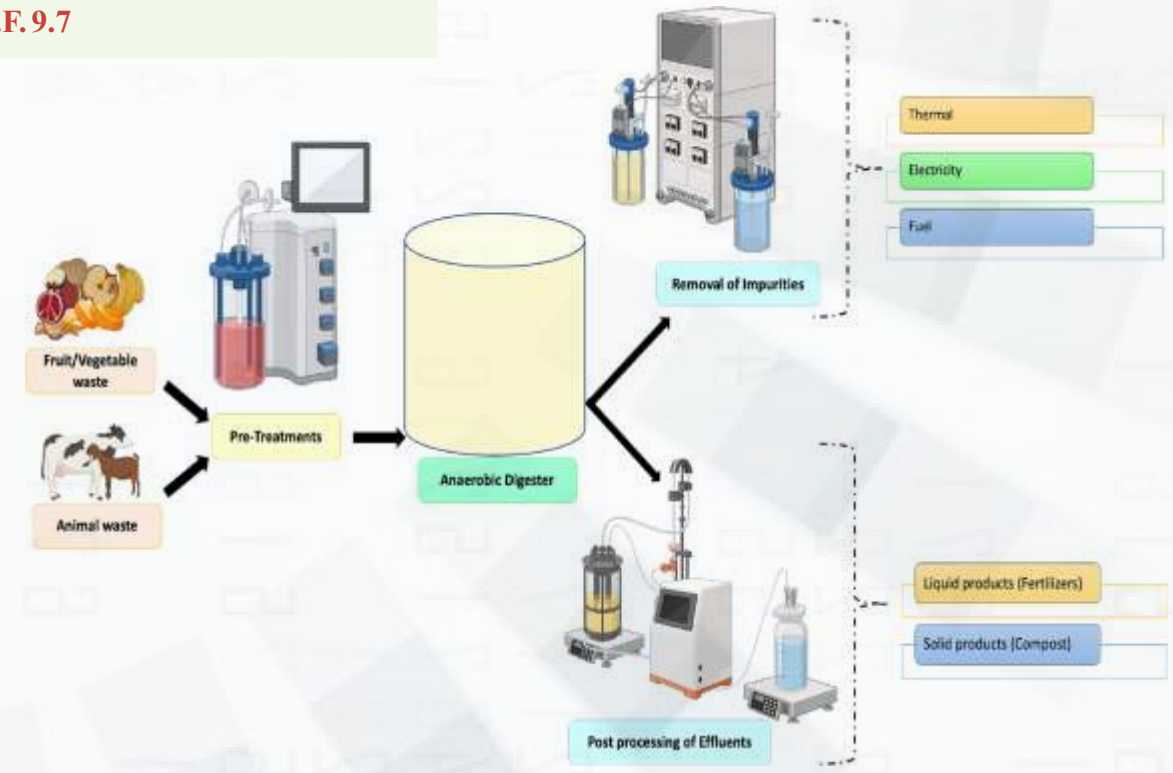
I.F. 9.7

A useful way to reduce food waste (FW) environmental impact is by turning it into biofertilizer. The conversion of FW into biogas can be used for agricultural applications after being converted into biofertilizer through techniques such as anaerobic digestion (AD), composting, and vermicomposting. Through use of food waste digestate (FWD) as a biofertilizer, nutrient loops are closed and waste is reduced. Instead of dumping FW into landfills, which contributes to greenhouse gas emissions, the waste is processed into digestate and fed to plants, creating a sustainable cycle. In addition to enhancing soil micronutrients, reducing environmental pollution, and reducing the need for chemical fertilizers, FW biofertilizers contribute to the circular economy. There are several methods for applying FWD to agricultural fields, including surface spreading, injection, and incorporation into the soil. Technology for converting FW to biofertilizers is sustainable, and invention productivity can be increased through well-procedure regulatory approaches and innovative machinery.



Anaerobic digestion of food waste for the generation of biofuel.

Energy

Khan et al., (2024) 302:131686

Design and development of grid independent integrated energy system for electric vehicle charging stations at different locations in Malaysia

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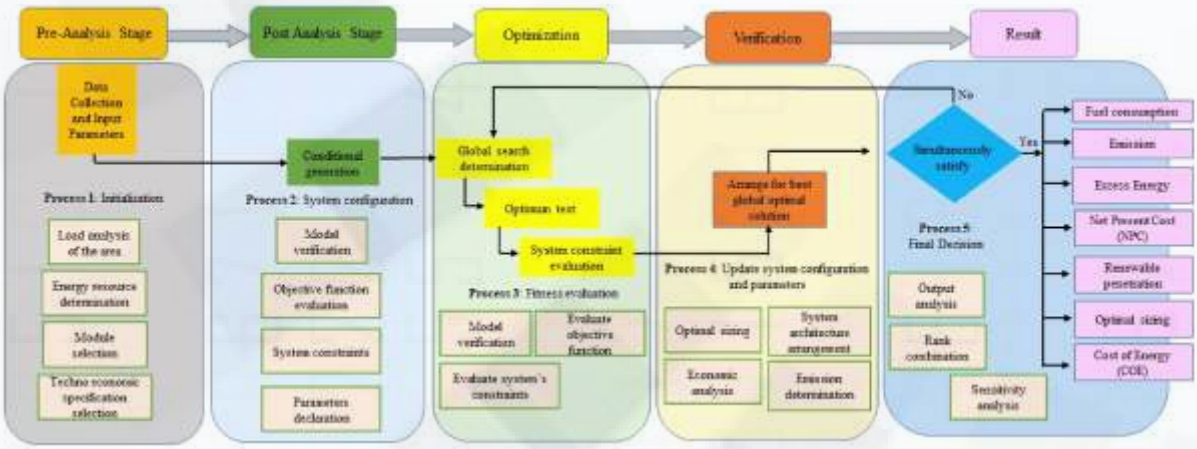
I.F. 9.0

Electric vehicles (EVs) have revolutionized the transportation sector as an alternative to conventional fossil fuel-based transportation. It becomes more effective when the charging energy comes from green, renewable, cost-effective, eco-friendly resources. The present work discusses modelling a hybrid renewable energy system for EV charging stations in Malaysia. This work presents techno-economic investigation for different hybrid energy system arrangements of solar photovoltaic (PV), wind turbine (WT), natural gas generator (GS) and battery energy storage (BES) for EV charging station. The EV load demand is calculated based on the transportation fleet of an institution considered for five different climatic locations in Malaysia using HOMER-Pro software. Considering the technical sizing of the hybrid system, the minimization of the energy system and net present cost are discussed for each locations. The optimization study of hybrid energy systems is further examined for social benefits and environmental analysis by including the human development and employment creation index. The comparative analysis of hybrid energy storage systems is performed separately. This study uses sensitivity analysis to elaborate on the cost-effectiveness and technical feasibility of the hybrid system, considering the cost of system components, macroeconomics parameters, and load variation. The finalized results indicate that the solar PV-BES-GS12 hybrid energy system is the most suitable combination for the integrated grid-independent EV charging station operation at each locations.



Methodology of present work

Separation and Purification Technology
Ahmad et al., (2024) 350:127826

Design of novel Sb2S3/Polythiophene heterojunction for efficient adsorption and methanol sensing

Nafees Ahmad[a], Qazi Inamur Rahman[a], Arshad Iqbal[b], Masoom Raza Siddiqui[c], Saikh Mohammad Wabaidur[c], Naseem Ahmad a, Frederic Coulon[d]

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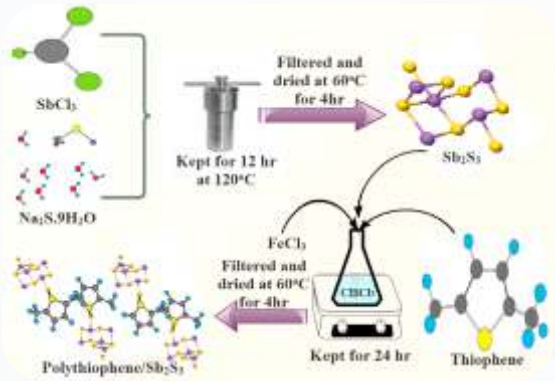
I. F. 8.1

Eliminating micropollutants in trace concentrations in water bodies is crucial and challenging due to their persistent and bioactive characteristics. Due to these characteristics, their detection and removal pose a challenge to the conventional removal methods and to the health of the community. To effectively remove the pollutants, it requires the design and development of an efficient technique compared to the conventional techniques. The design of highly efficient methanol sensor and the adsorption of micropollutants by a heterojunction involving Sb2S3 and polythiophene (PTh) looks promising. The adsorption study was targeted on RhB dye whereas methanol was targeted to sensing application. Sb2S3 nanoparticles was synthesized by hydrothermal methods and incorporated into thiophene solution during chemical oxidative polymerization of thiophene. The heterojunction was applied to remove RhB dye through the adsorption process. Freundlich isotherm model and Langmuir isotherm model were used to study the adsorption of RhB. The higher adsorption capacity was found in case of Sb2S3/PTh is 99.8 mg g−1, and the rate constant (K2) was found to be 0.0206 min−1. The catalysts follows the pseudo-first and second order kinetics in the removal of RhB dye. The rate constant for adsorption k1 is 0.1347 min−1 and the rate constant for diffusion is 0.297 min−1. Moreover, the PTh/Sb2S3 shows an effective methanol sensing up to 0.7 mM and the current response at 0.6756 V of the oxidation peaks shows the presence of methanol.

(a)



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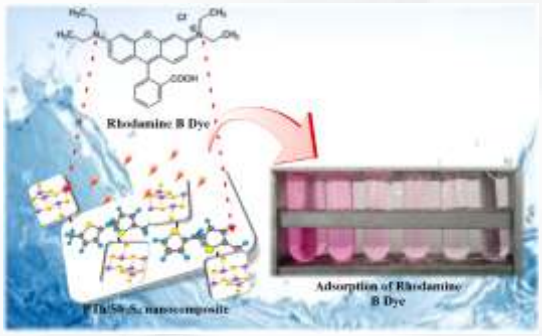

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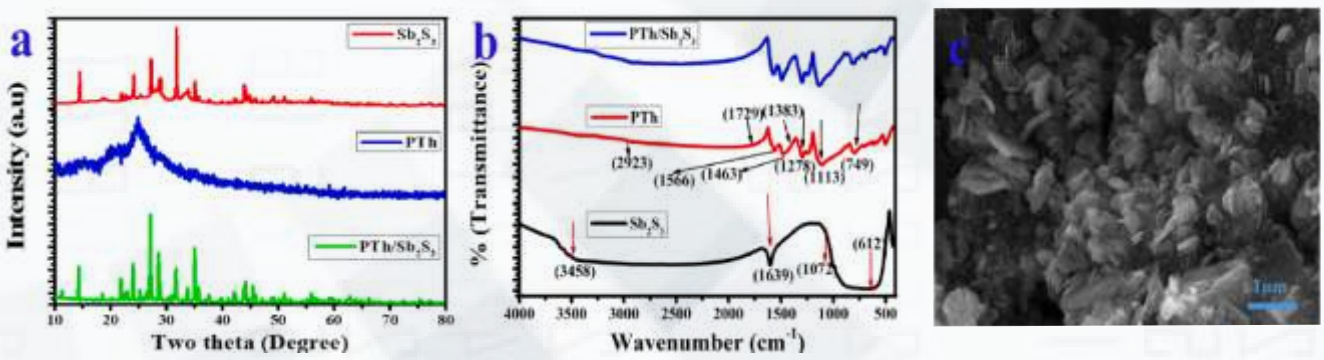

Efficient adsorption and methanol sensing

Critical Reviews in Biotechnology
Sharma et al., (2024) 44(6):1040-1060

Synergetic anaerobic digestion of food waste for enhanced production of biogas and value-added products: strategies, challenges, and techno- economic analysis

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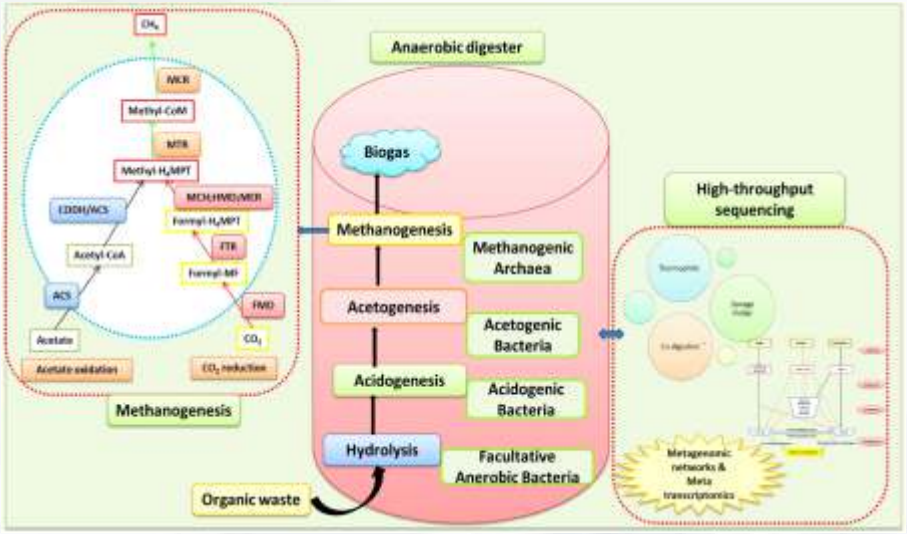
I.F. 8.1

The generation of food waste (FW) is increasing at an alarming rate, contributing to a total of 32% of all the waste produced globally. Anaerobic digestion (AD) is an effective method for dealing with organic wastes of various compositions, like FW. Waste valorization into value-added products has increased due to the conversion of FW into biogas using AD technology. A variety of pathways are adopted by microbes to avoid unfavorable conditions in AD, including competition between sulfate-reducing bacteria and methane (CH4)-forming bacteria. Anaerobic bacteria decompose organic matter to produce biogas, a digester gas. The composition depends on the type of raw material and the method by which the digestion process is conducted. Studies have shown that the biogas produced by AD contains 65–75% CH4 and 35–45% carbon dioxide (CO2). Methanothrix soehngenii and Methanosaeta concilii are examples of species that convert acetate to CH4 and CO2. Methanobacterium bryantii, Methanobacterium thermoautotrophicum, and Methanobrevibacter arboriphilus are examples of species that produce CH4 from hydrogen and CO2. Methanobacterium formicicum, Methanobrevibacter smithii, and Methanococcus voltae are examples of species that consume formate, hydrogen, and CO2 and produce CH4. The popularity of AD has increased for the development of biorefinery because it is seen as a more environmentally acceptable alternative in comparison to physico-chemical techniques for resource and energy recovery. The review examines the possibility of using accessible FW to produce important value-added products such as organic acids (acetate/butyrate), biopolymers, and other essential value-added products.



Interspecies symbiosis during anaerobic digestion of organic wastes for bio methanation.

International Journal of Hydrogen Energy
Sharma et al., (2024) 52:46-60

Biotransformation of food waste into biogas and hydrogen fuel e A review

Pooja Sharma [a,b,1], **Ambreen Bano** [c,1], Surendra Pratap Singh [d,1], John D. Atkinson [e], Su Shiung Lam [f,g], Hafiz M.N. Iqbal [h,*], Yen Wah Tong [a,b,i,**]

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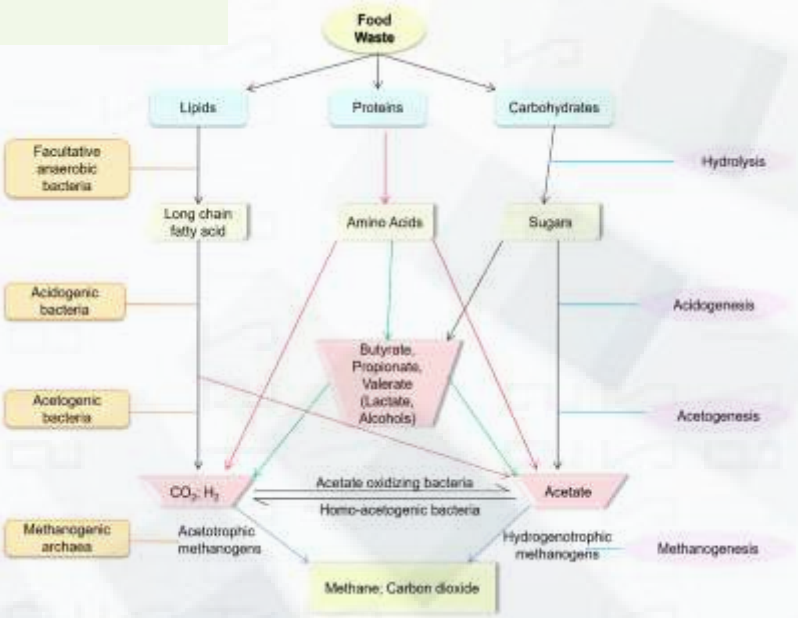
I.F. 8.1

The amount of waste generated globally is rising along with the growth of the population, including biological waste, which reaches billions of tons every year. An enormous amount of food waste (FW) is produced throughout the food production chain, which threatens human health and the environment. Waste-to-biogas conversion, as a prime example of waste-to-energy technology, offers a simple approach to simultaneously address the issue of the rising demand for renewable energy sources. Anaerobic digestion (AD) of FW produces biofuel, bioenergy, and fertilizers. In addition to providing a sustainable waste management alternative to landfills, the creation of hydrogen through resource recovery and waste material conversion processes can be used to produce renewable fuels. To be taken seriously as a candidate for manufacturing hydrogen, it must be economically feasible, cutting costs and providing a sustainable waste management option. This article reviews the literature and provides a techno-economic analysis of the possibilities for producing biogas and hydrogen fuel from several types of FW. Additionally, recommendations for improving waste-to-biogas and hydrogen technology are provided as part of a comprehensive solution for potential renewable energy.



Process of food waste to energy production

Energy Strategy Reviews
Minai et al., (2024) 53:101390

Evolution and role of virtual power plants : Market strategy with integration of renewable based microgrids

Ahmad Faiz Minai[a], Akhlaque Ahmad Khan[a,**], Kitmo[b], Mouhamadou Falilou Ndiaye[c], Tabish Alam[d], Rohit Khargotra[e,f,*], Tej Singh[g]
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e Institute of Materials Engineering, Faculty of Engineering, University of Pannonia, Veszprem, 8200, Hungary
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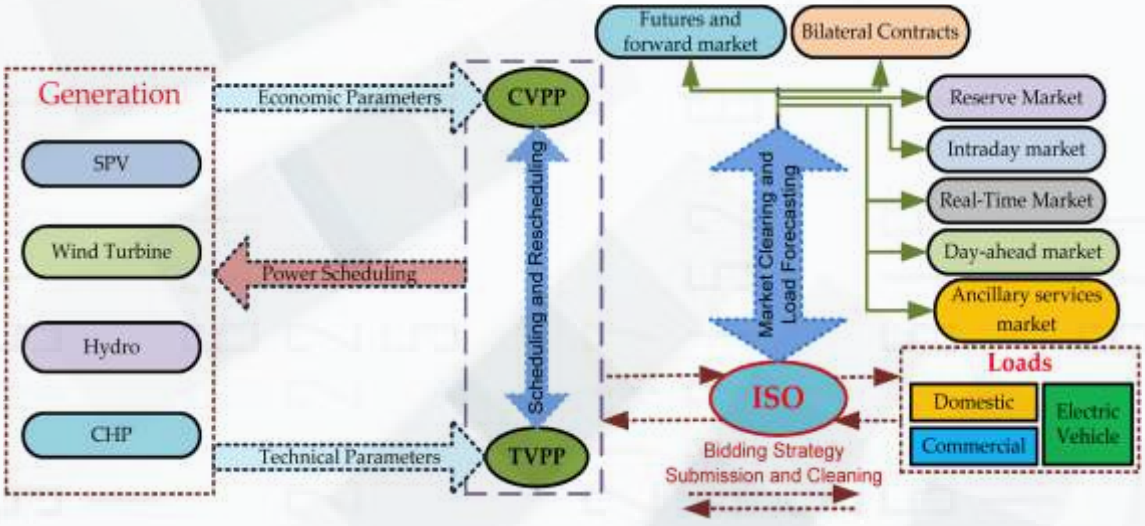
I.F. 7.9

The use of distributed energy resources (DER) programs, which include separate renewable energy (RE) programs, has expanded in residential as well as commercial structures as an outcome of recent technological developments. The virtual power plant (VPP) may improve the security and reliability of an electricity grid's operations through including energy storage, changeable loads, and distributed energy resources (DER), among other characteristics. Consequently, a growing number of scholars tend to focus on VPP and providing recommendations for its improvement. In order to facilitate the incorporation of distributed generation into electricity distribution systems, cutting-edge management ideas for facilities have emerged in the last few years. As a result, it is now more crucial than ever to improve management abilities for the combining of dispersed energy output and consumption using various virtual power plants (VPPs). To increase operational profits, it's crucial to make use of their capacity to play a role in power markets. This work provides a classification scheme for, and an in-depth analysis of, recent studies that provide VPP models featuring interactions with various forms of electricity markets. The objective of this article is to find out which VPP strategy will yield the greatest possible return in each legislative scenario. These consist of the model's design, strategies for resolving complex mathematical problems, involvement in various marketplaces, and the application of the suggested models to real-world case studies. The research has been evaluated, and it has been concluded that contemporary models are more comprehensive and realistic. This article additionally elaborates on and emphasizes the VPP concept from other researchers' findings. Moreover, a number of prevalent VPP projects from throughout the globe are included. The VPP research also addresses some potential challenges and recommendations for prospective growth.



A basic model of virtual power plant consisting of DERs.

International Journal of Biological Macromolecules
Hussain et al., (2024) 270(2):132466

A review of nanotechnology in enzyme cascade to address challenges in pre-treating biomass

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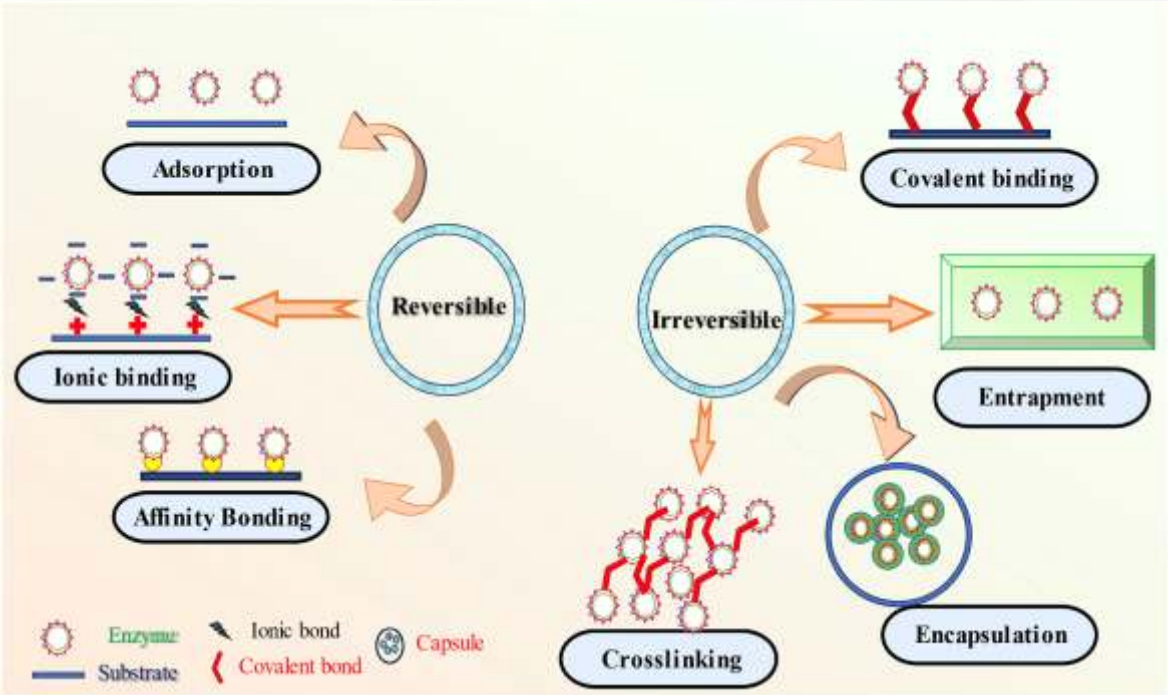
I.F. 7.7

Nanotechnology has become a revolutionary technique for improving the preliminary treatment of lignocellulosic biomass in the production of biofuels. Traditional methods of pre-treatment have encountered difficulties in effectively degrading the intricate lignocellulosic composition, thereby impeding the conversion of biomass into fermentable sugars. Nanotechnology has enabled the development of enzyme cascade processes that present a potential solution for addressing the limitations. The focus of this review article is to delve into the utilization of nanotechnology in the pretreatment of lignocellulosic biomass through enzyme cascade processes. The review commences with an analysis of the composition and structure of lignocellulosic biomass, followed by a discussion on the drawbacks associated with conventional pre-treatment techniques. The subsequent analysis explores the importance of efficient pre-treatment methods in the context of biofuel production. We thoroughly investigate the utilization of nanotechnology in the pre-treatment of enzyme cascades across three distinct sections. Nanomaterials for enzyme immobilization, enhanced enzyme stability and activity through nanotechnology, and nanocarriers for controlled enzyme delivery. Moreover, the techniques used to analyse nanomaterials and the interactions between enzymes and nanomaterials are introduced. This review emphasizes the significance of comprehending the mechanisms underlying the synergy between nanotechnology and enzymes establishing sustainable and environmentally friendly nanotechnology applications.



Major enzyme immobilization methods; Irreversible methods include covalent binding, entrapment, encapsulation, and cross-linking and Reversible methods include adsorption, ionic bonding, and affinity bonding.

International Journal of Biological Macromolecules
Ahmad et al., (2024) 273(2):133083

An affordable label-free ultrasensitive immunosensor based on gold nanoparticles deposited on glassy carbon electrode for the transferrin receptor detection

Abrar Ahmad[a], Gulam Rabbani[b,*], Mazin A. Zamzami[a], Salman Hosawi[a], Othman A. Baothman[a], Hisham Altayeb[a], Muhammad Shahid Nadeem Akhtar[a], Varish Ahmad[c], **Mohsin Vahid Khan[d],** Mohammad Ehtisham Khan[e], Se Hyun Kim[f]

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b IT-medical Fusion Center, 350-27 Gumidae-ro, Gumi-si, Gyeongbuk 39253, Republic of Korea
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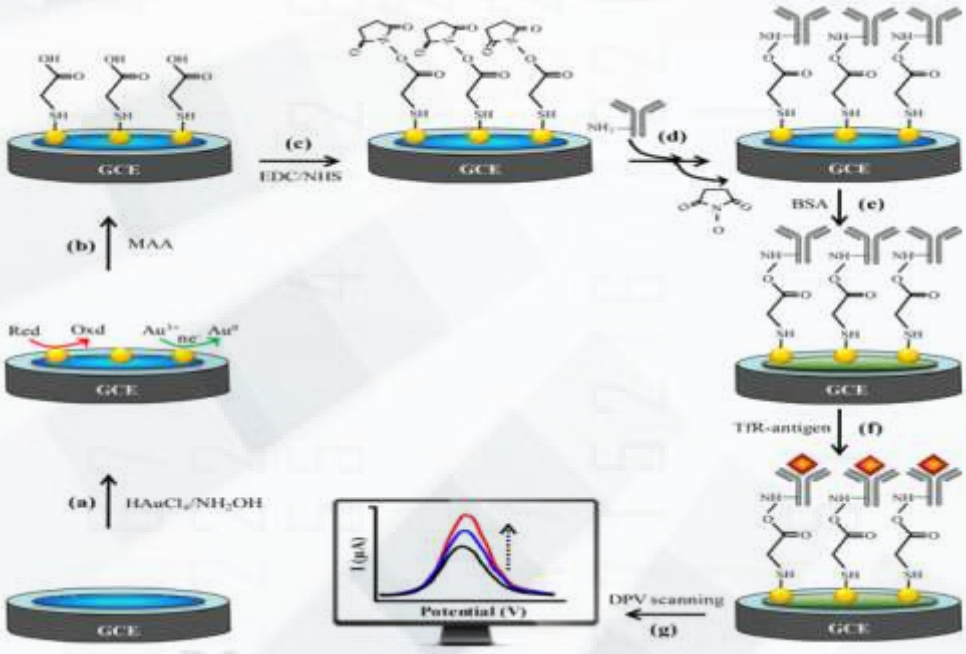
I.F. 7.7

In recent decades, there has been a concerning and consistent rise in the incidence of cancer, posing a significantthreat to human health and overall quality of life. The transferrin receptor (TfR) is one of the most crucial protein biomarkers and is overexpressed in various cancers. This study reports on the development of a novel voltammetric immunosensor for TfR detection. The electrochemical platform was made up of a glassy carbon electrode (GCE) functionalized with gold nanoparticles (AuNPs), on which anti-TfR was immobilized. The surface characteristics and electrochemical behaviors of the modified electrodes were comprehensively investigated through scanning electron microscopy, XPS, Raman spectroscopy FT-IR, electrochemical cyclic voltammetry and impedance spectroscopy. The developed immunosensor exhibited robust analytical performance with TfR fortified buffer solution, showing a linear range (LR) response from 0.01 to 3000 µg/mL, with a limit of detection (LOD) of 0.01 µg/mL and reproducibility (RSD <4 %). The fabricated sensor demonstrated high reproducibility and selectivity when subjected to testing with various types of interfering proteins. The immunosensor designed for TfR detection demonstrated several advantageous features, such as being cost-effective and requiring a small volume of test sample making it highly suitable for point-of-care applications.



The schematic illustration for fabrication of AuNPs@GCE based immunosensor and electrochemical detection of TfR antigen.

Environmental Pollution
Gaur et al., (2024) 354:124134

Integrating advanced techniques and machine learning for landfill leachate treatment: Addressing limitations and environmental concerns

Vivek Kumar Gaur[a,b], Krishna Gautam[a], **Reena Vishvakarma[c], Poonam Sharma[c],** Upasana Pandey[d], Janmejai Kumar Srivastava[c], Sunita Varjani[f,g,h], Jo-Shu Chang[i,j,k] et al.

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I. F. 7.6

This review article explores the challenges associated with landfill leachate resulting from the increasing disposal of municipal solid waste in landfills and open areas. The composition of landfill leachate includes antibiotics (0.001-100 µg), heavy metals (0.001-1.4 g/L), dissolved organic and inorganic components, and xenobiotics including polyaromatic hydrocarbons (10-25 µg/L). Conventional treatment methods, such as biological (microbial and phytoremediation) and physicochemical (electrochemical and membrane-based) techniques, are available but face limitations in terms of cost, accuracy, and environmental risks. To surmount these challenges, this study advocates for the integration of artificial intelligence (AI) and machine learning (ML) to strengthen treatment efficacy through predictive analytics and optimized operational parameters. It critically evaluates the risks posed by recalcitrant leachate components and appraises the performance of various treatment modalities, both independently and in tandem with biological and physicochemical processes. Notably, physicochemical treatments have demonstrated pollutant removal rates of up to 90% for various contaminants, while integrated biological approaches have achieved over 95% removal efficiency. However, the heterogeneous nature of solid waste composition further complicates treatment methodologies. Consequently, the integration of advanced ML algorithms such as Support Vector Regression, Artificial Neural Networks, and Genetic Algorithms is proposed to refine leachate treatment processes. This review provides valuable insights for different stakeholders specifically researchers, policymakers and practitioners, seeking to fortify waste disposal infrastructure and foster sustainable landfill leachate management practices. By leveraging AI and ML tools in conjunction with a nuanced understanding of leachate complexities, a promising pathway emerges towards effectively addressing this environmental challenge while mitigating potential adverse impacts.

Role of Machine Learning in Municipal Solid Waste Management

Engineering Applications of Artificial Intelligence
Siddiqui et al., (2023) 118: 105699

Research on significant factors affecting adoption of blockchain technology for enterprise distributed applications based on integrated MCDM FCEM-MULTIMOORA-FG method

Zeeshan Ali Siddiqui ⁎, Mohd. Haroon

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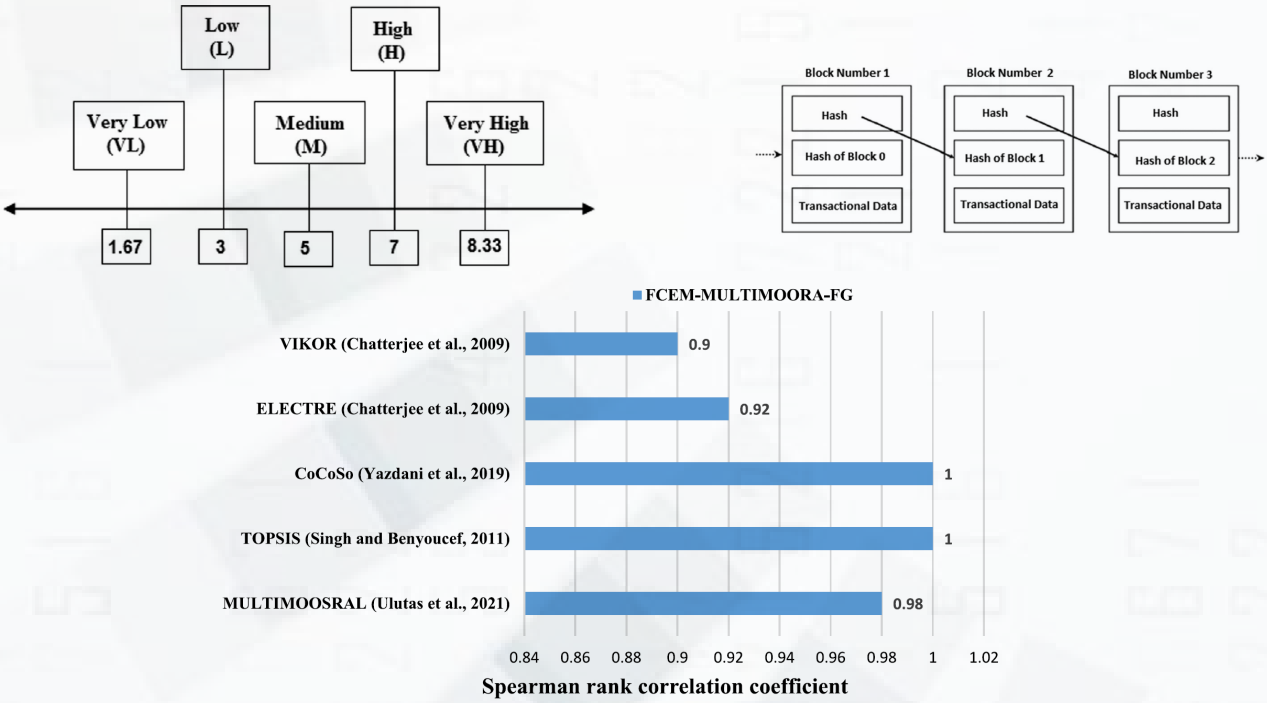
I.F.7.5

Blockchain technology-powered applications infuse trust in the system without intermediary entities. Researchers' interest in blockchain technology has increased dramatically in recent years as a result of this distinguishing feature. However, the adoption of this novel paradigm in enterprise distributed applications is not very encouraging. To adopt a new technology in an industry, managers and technocrats have to do multiplecriteria decision-making (MCDM) in a fuzzy environment. The aim of this study is to propose a system model for the identification and monitoring of significant factors responsible for the slow adoption rate of blockchain technology. In this research, the MULTIMOORA method for group decision-making, a popular MCDM approach, has been further extended by integrating the information entropy weight–fuzzy comprehensive evaluation model (IEW-FCEM) for an uncertain environment. The proposed method of FCEM-MULTIMOORA-FG combines the benefits of four best-in-class ranking methods, namely, the fuzzy ratio system, the fuzzy reference point method, the fuzzy full multiplicative form, and the IEW-FCEM. The idea behind integrating the IEW-FCEM with MULTIMOORA-FG is that information entropy will derive the objective weights of the criteria, thus removing the dependency upon subject matter expert experience only. An empirical study demonstrates the efficacy and practicability of the FCEM-MULTIMOORA-FG method. The simulation results demonstrate that the proposed method is computationally straightforward with better position accuracy than previous algorithms and that its basic idea is logical and understandable, making it easier to apply in a computer system. Additionally, a comparative analysis with five more MCDM methods was executed to validate the results.



Factors affecting adoption of blockchain technology

Knowledge-Based Systems
Jalil et al., (2023) 278:110839

A hierarchical multi-level model for compromise allocation in multivariate stratified sample surveys with non-response problem

Syed Aqib Jalil[a], **Ahteshamul Haq**[b,c], Ali Al Owad[d], Nausheen Hashmi[e], Nitesh Kumar Adichwal[f]

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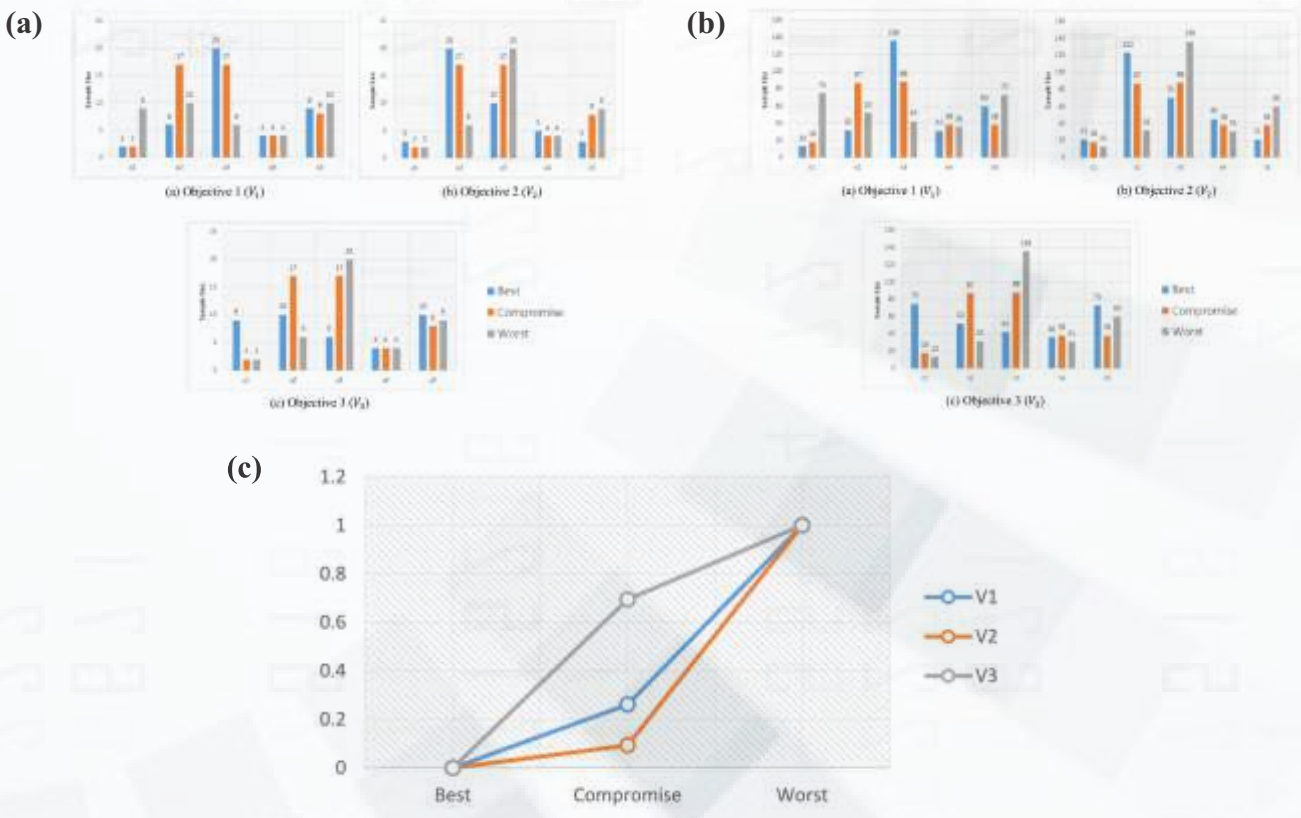
I. F. 7.2

Stratified sampling, a widely-applicable probabilistic technique, is especially suited for large and heterogeneously distributed populations. This paper studies optimal allocation of sampling units to minimize variances and cost. Given that not all strata hold equal importance in survey projects, we propose a hierarchical multi-level programming model for compromise allocation in stratified sampling. The model considers multiple objectives across hierarchical levels and addresses the issue of non-response by dividing strata into respondent and non-respondent groups. The survey budget restriction is considered as a constraint in our model. We employ a fuzzy concept-based solution methodology to solve the multi-level allocation problem. A literature-based numerical example describes the model's applicability and efficiency. Comparative analysis shows our model's superior efficiency over existing models due to its optimization of allocation across varied strata, non-response consideration, and budget constraint integration. The proposed model promotes flexibility, enhancing representativeness and cost-effectiveness of large-scale surveys, thereby improving decision-making in research and industry settings.



Hierarchical multi-level model for compromise allocation

Sustainable Energy Technologies and Assessments
Pachauri et al., (2023) 58:103353

Study on Meta-heuristics techniques for shade dispersion to enhance GMPP of PV array systems under PSCs

Rupendra Kumar Pachauri [a,*], Mohit Kumar [b], Sudhakar Babu Thanikanti [c,*], Neeraj Kumar Shukla [d], Piyush Kuchhal [a], **Ahmad Faiz Minai [e],** Akhilesh Sharma [f]

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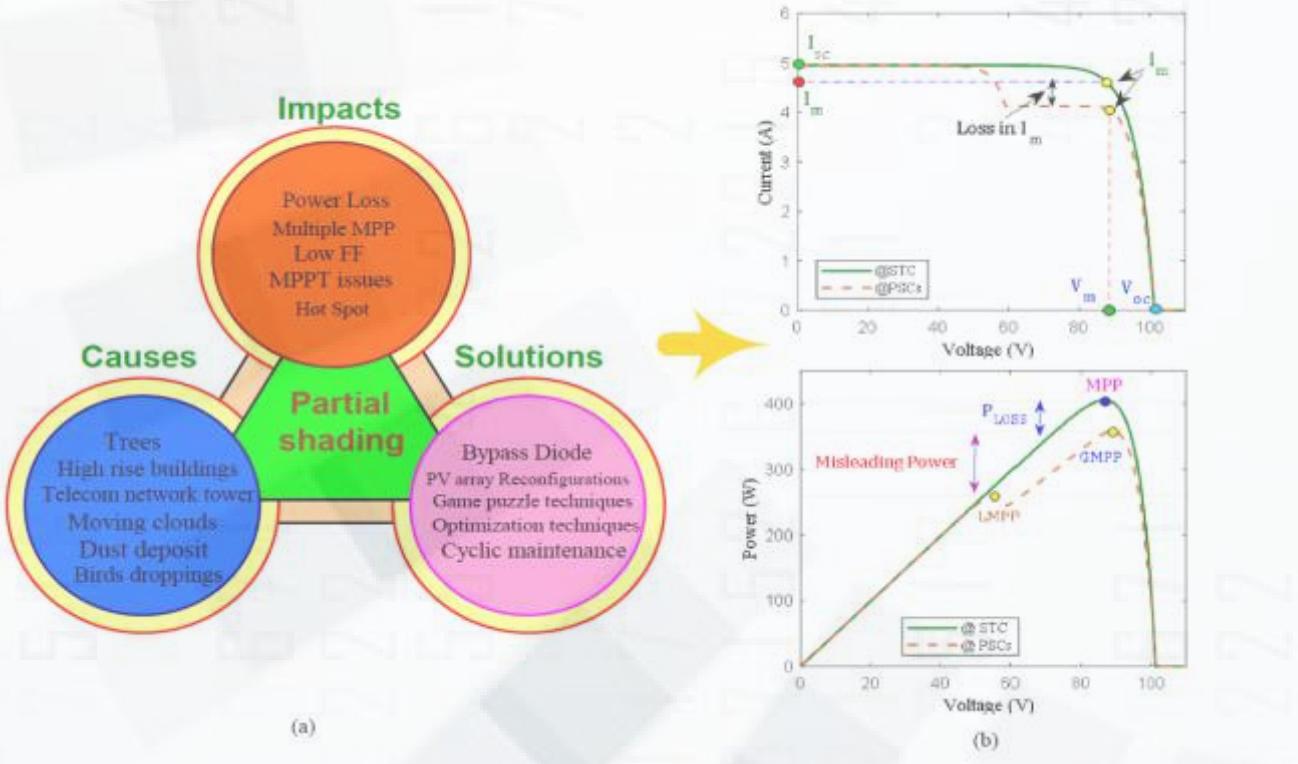
I.F. 7.1

Reconfiguring the photovoltaic modules in an array is one option for reducing the influence of partial shadowing circumstances, which shows the shade dispersion property on the entire photovolatic array. This paper proposes a novel meta-heuristic optimization technique named Vommi that resolves the reconfiguration process of shaded modules in a photovoltaic array. Using the proposed objective function, the major goal of this unique optimization technique is to maximize the power extracted from the shaded PV array during shading conditions. The proposed meta-heuristic Vommi optimization algorithm is compared to conventional total cross-tied, and particle swarm optimization algorithm-based configurations in terms of power at the global maximum power point, improved fill factor, power losses, execution ratio, etc. The global maximum power point of the Vommi optimization algorithm configuration delivers such as 990 W, 1283 W, 1181 W, and 1173 W, which are higher than conventional approaches during all four partial shodowing circumstances and smoother power-voltage characteristics.



(a) PSCs: causes, impacts, and solutions (b) P-V and I-V curves.

Biomedicine & Pharmacotherapy
Prabhu et al., (2024) 175:116663

H2AX: A key player in DNA damage response and a promising target for cancer therapy

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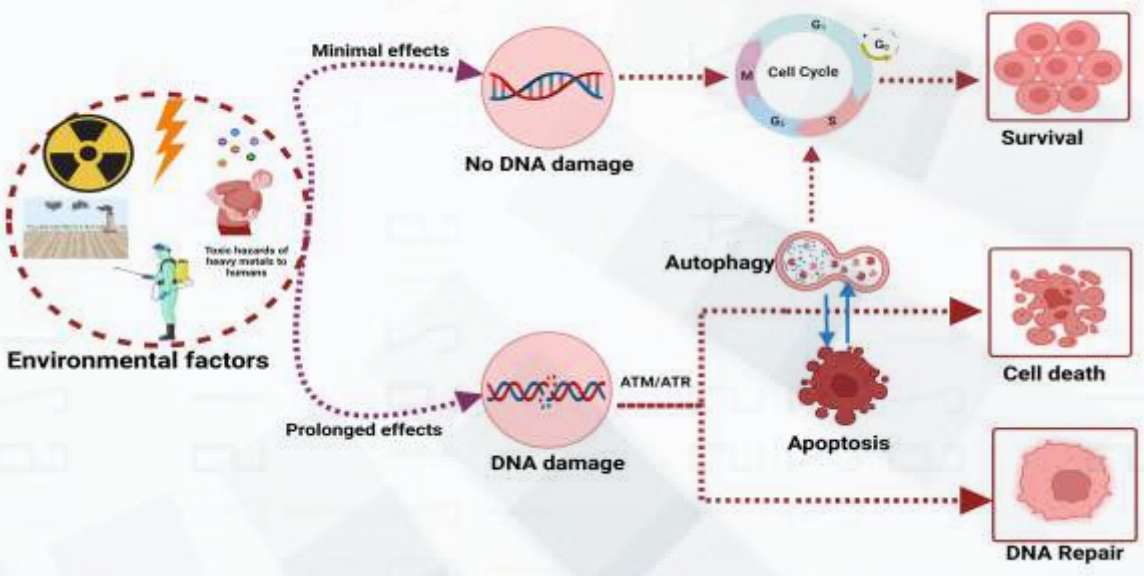
I.F. 6.9

Cancer is caused by a complex interaction of factors that interrupt the normal growth and division of cells. At the center of this process is the intricate relationship between DNA damage and the cellular mechanisms responsible for maintaining genomic stability. When DNA damage is not repaired, it can cause genetic mutations that contribute to the initiation and progression of cancer. On the other hand, the DNA damage response system, which involves the phosphorylation of the histone variant H2AX (γH2AX), is crucial in preserving genomic integrity by signaling and facilitating the repair of DNA double-strand breaks. This review provides an explanation of the molecular dynamics of H2AX in the context of DNA damage response. It emphasizes the crucial role of H2AX in recruiting and localizing repair machinery at sites of chromatin damage. The review explains how H2AX phosphorylation, facilitated by the master kinases ATM and ATR, acts as a signal for DNA damage, triggering downstream pathways that govern cell cycle checkpoints, apoptosis, and the cellular fate decision between repair and cell death. The phosphorylation of H2AX is a critical regulatory point, ensuring cell survival by promoting repair or steering cells towards apoptosis in cases of catastrophic genomic damage. Moreover, we explore the therapeutic potential of targeting H2AX in cancer treatment, leveraging its dual function as a biomarker of DNA integrity and a therapeutic target. By delineating the pathways that lead to H2AX phosphorylation and its roles in apoptosis and cell cycle control, we highlight the significance of H2AX as both a prognostic tool and a focal point for therapeutic intervention, offering insights into its utility in enhancing the efficacy of cancer treatments.



Comprehensive analysis of environmental impact on DNA damage and repair processes.

Plant Stress
Yusuf et al., (2023) 10:100222

Hydrogen sulfide counteract copper induced inhibition of photosynthetic performance through altered proline metabolism and enhanced antioxidants in Cucumis sativus

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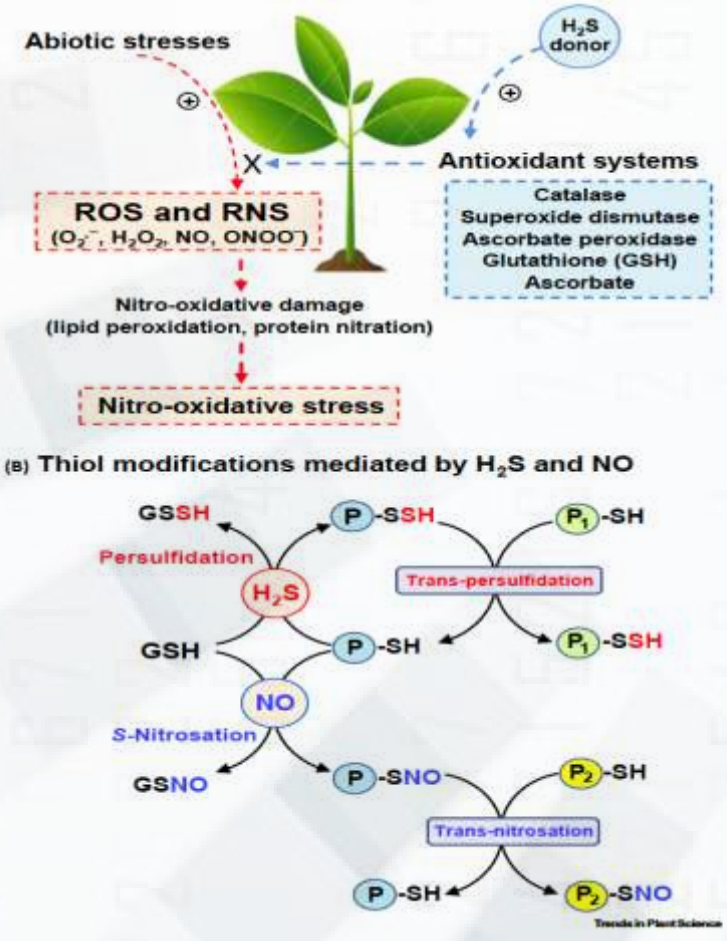
I.F. 6.8

It has been recently discovered that hydrogen sulfide (H_2S) is a gaseous substance responsible for controlling the growth and metabolism of plants. The present study was designed to explore the ameliorative effect of H_2S on *Cucumis sativus* plants under increasing levels of copper. This study revealed that varying concentrations of H_2S improved seed germination in a concentration-dependent manner. Furthermore, exogenous application of H_2S to copper stressed plants accelerated photosynthetic performance, antioxidant system, proline accumulation, and maintained copper uptake that was reflected in improved growth parameters. In addition to this, H_2S also curbed oxidative stress by lowering lipid peroxidation, H_2O_2 content, and electrolyte leakage. H_2S enhanced activities of the antioxidant system, and proline metabolism leading to decontamination of cucumber plants under lethal dose of copper. This work offers an understanding that exogenously sourced H_2S could be engaged as a significant biochemical approach in alleviating copper-induced toxicity in cucumber plants.



Cascade of events after exogenous H2S application

Postharvest Biology and Technology
Rai et al., (2024) 209:112684

Assessing the potential of chitosan based coatings in modulation of bacteriome on tomato carposphere

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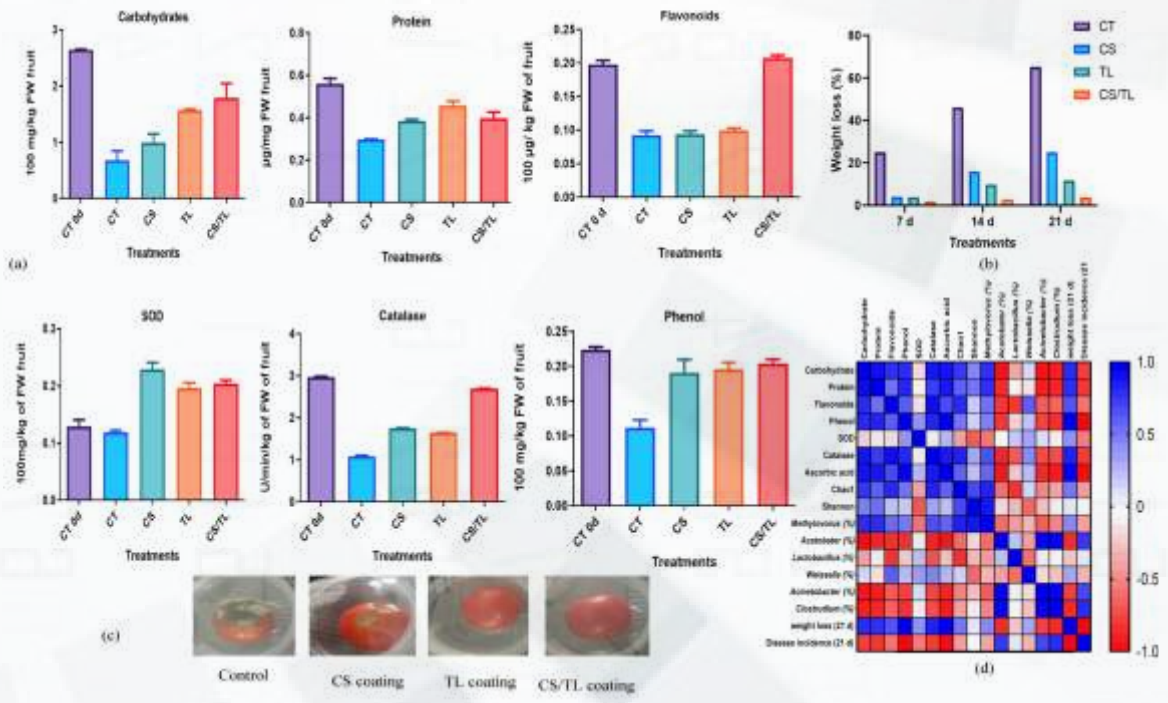
I.F. 6.4

Chitosan based edible fruit coatings are being considered today as an unconventional, ecofriendly and safe alternative of postharvest chemical treatments. The mechanism of action of chitosan coatings, like its antifungal nature or forming a barrier for transpiration and respiration, is already known. We intended to study the effect of the chitosan on natural carposphere microbiome, specifically on non-culturalable bacterial communities during storage to explore the prebiotic like nature of the chitosan based coatings. Hence the effect of coatings viz. CS (1% Chitosan), TL (Tulsi or Ocimum sanctum leaf, 1 g L-1 aqueous extract), and CS/TL mixed (2:1, 1% Chitosan and Tulsi leaf extract) was observed on coated tomato fruit. Metagenomic bacteriome analyses revealed that the untreated samples were comparatively rich epiphytic bacterial flora though the core microbiome was conserved in all the samples. Bacterial community in ripened tomato fruit (after 7 d) was mostly dominated by Acetobacter (49%) while on treatment of coatings genera like Lactobacillus, Weissella, Methylovoruse, Bacillus and Pseudomonas increased. These bacteria can act as potential bio agents in carposphere while the probiotic nature of genera as Lactobacillus or Weissella can also help in delaying the ripening of fruit. As this was a pilot study, more such studies are needed on microbial communities associated with fruits, their assembly and dynamics as well as the nature of their contribution to fruit quality and pathogen resistance during fruit ripening and storage.



Effect of coating treatments on total sugar, and protein; flavonoids, phenol content and enzyme activity of tomato fruit

Environmental Microbiome
Huete-Stauffer et al., (2023) 18(1):87

Increased prokaryotic diversity in the Red Sea deep scattering layer

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2 Institute of Marine Sciences (ICM), CSIC, Barcelona, Spain
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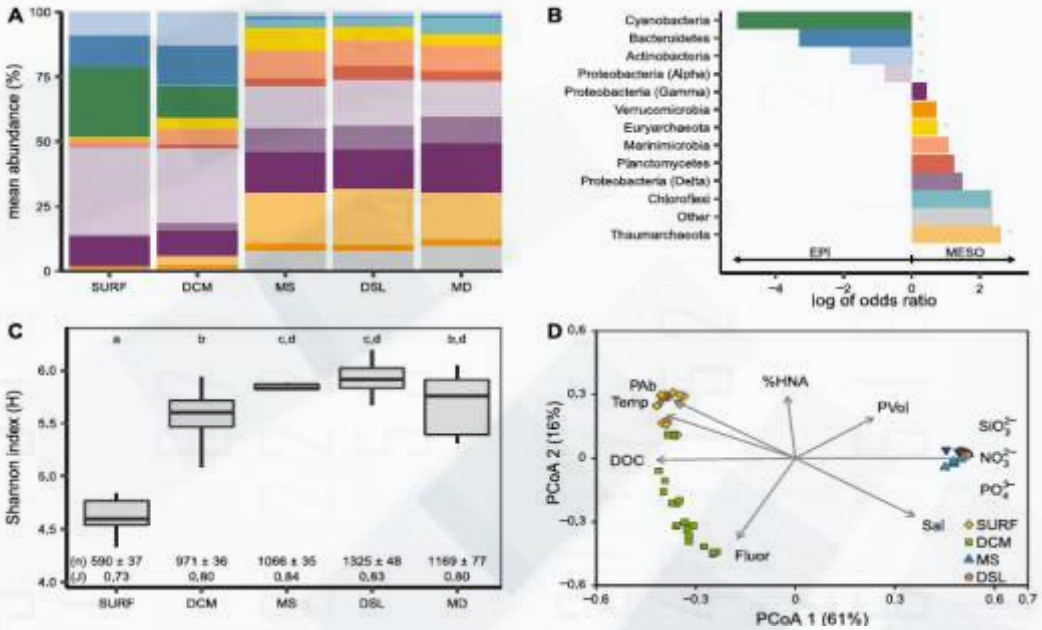
4 Marine Ecology and Systematics, Biology Department, University of the Balearic Islands (UIB), Palma, Spain
5 Centro Oceanografico de Gijon/Xixon (IEO), CSIC, Gijon, Spain

I.F. 6.2

Background : The diel vertical migration (DVM) of fish provides an active transport of labile dissolved organic matter(DOM) to the deep ocean, fueling the metabolism of heterotrophic bacteria and archaea. We studied the impact of DVM on the mesopelagic prokaryotic diversity of the Red Sea focusing on the mesopelagic deep scattering layer (DSL) between 450–600 m.

Results : Despite the general consensus of homogeneous conditions in the mesopelagic layer, we observed variability in physico-chemical variables (oxygen, inorganic nutrients, DOC) in the depth profiles. We also identified distinct seasonal indicator prokaryotes inhabiting the DSL, representing between 2% (in spring) to over 10% (in winter) of total 16S rRNA gene sequences. The dominant indicator groups were Alteromonadales in winter, Vibrionales in spring and Microtrichales in summer. Using multidimensional scaling analysis, the DSL samples showed divergence from the surrounding mesopelagic layers and were distributed according to depth (47% of variance explained). We identified the sources of diversity that contribute to the DSL by analyzing the detailed profiles of spring, where 3 depths were sampled in the mesopelagic. On average, 7% was related to the epipelagic, 34% was commonamong the other mesopelagic waters and 38% was attributable to the DSL, with 21% of species being unique to this ayer.

Conclusions : We conclude that the mesopelagic physico-chemical properties shape a rather uniform prokaryotic community, but that the 200 m deep DSL contributes uniquely and in a high proportion to the diversity of the Red Sea mesopelagic.



Red Sea prokaryotic diversity.

Microbiological Research
Saxena et al., (2023) 276:127478

Current status of metabolic engineering of microorganisms for bioethanol production by effective utilization of pentose sugars of lignocellulosic biomass

Ayush Saxena, Akhtar Hussain, Fouziya Parveen, Mohammad Ashfaque*

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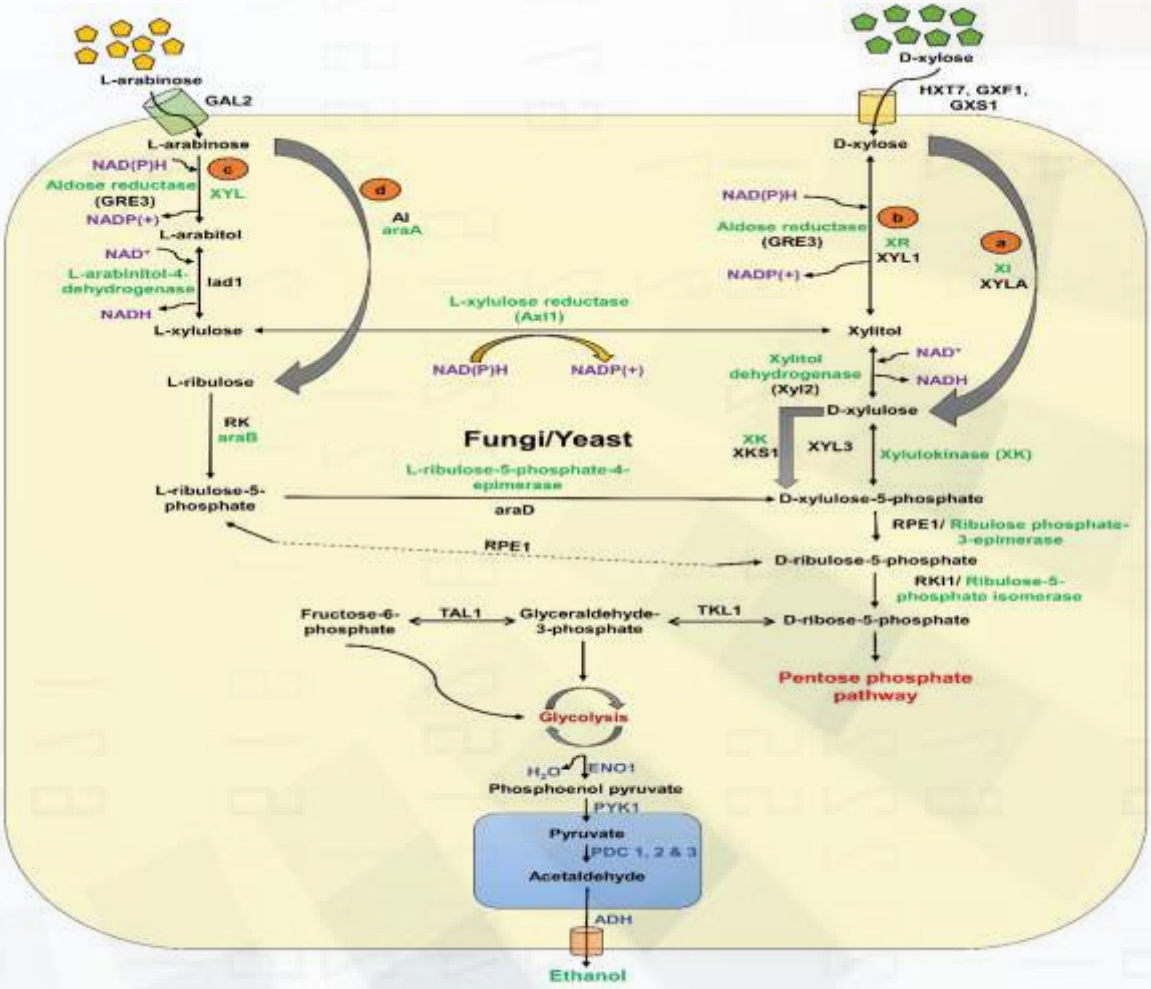
I.F. 6.1

Lignocellulosic biomass, consisting of homo- and heteropolymeric sugars, acts as a substrate for the generation of valuable biochemicals and biomaterials. The readily available hexoses are easily utilized by microbes due to the presence of transporters and native metabolic pathways. But, utilization of pentose sugar viz., xylose and arabinose are still challenging due to several reasons including (i) the absence of the particular native pathways and transporters, (ii) the presence of inhibitors, and (iii) lower uptake of pentose sugars. These challenges can be overcome by manipulating metabolic pathways/glycosidic enzymes cascade by using genetic engineering tools involving inverse-metabolic engineering, ex-vivo isomerization, Adaptive Laboratory Evolution, Directed Metabolic Engineering, etc. Metabolic engineering of bacteria and fungi for the utilization of pentose sugars for bioethanol production is the focus area of research in the current decade. This review outlines current approaches to biofuel development and strategies involved in the metabolic engineering of different microbes that can uptake pentose for bioethanol production.



D- xylose and L- arabinose utilization in fungi/yeast

Solar Energy
Fatima et al., (2024) 267:112206

Experimental analysis of dust composition impact on Photovoltaic panel Performance: A case study

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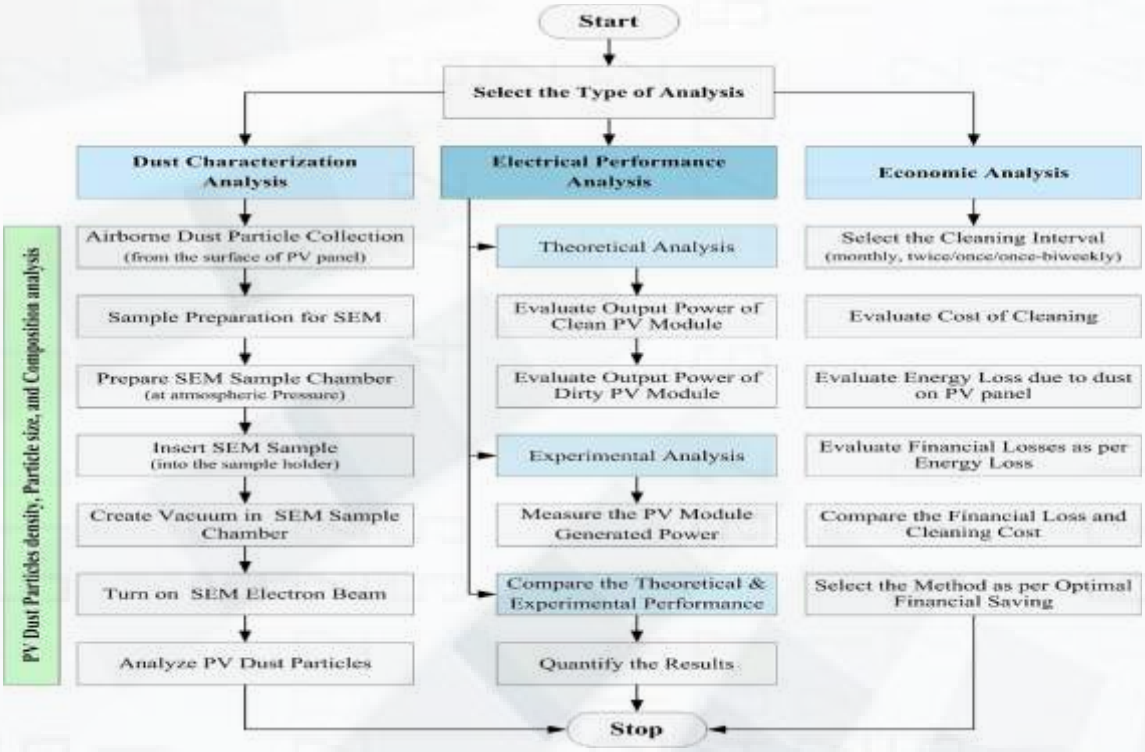
I.F. 6.0

Solar Photovoltaic systems are greatly influenced by meteorological conditions of the surrounding area, dust is the most influencing one. Dust deposition on the surface of photovoltaic (PV) panel hinder the penetration of solar radiation to PV cells and eventually reduce the power production of PV system. To overcome dust-based power losses, frequent cleaning is required depending on geographical location, PV integration scheme and size of the PV power plant. In this manuscript, consequences of dust deposition on photovoltaic systems such as drop in radiation and output power operating are studied, and the optimal time interval for cleaning is determined. Airborne dust particles were collected for a month for morphological and meteorological characterization. The average mass concentrations of the sample are 187.63 µgm-3, showcasing an irregular distribution of dust particles having unlike shapes and sizes. In this study, the influence of dust deposition is quantified using temperature and insolation for clean and dirty PV panels. The overall performance of the PV system is studied based on a comparison of quantified and recorded data. Lastly, different cleaning methodologies are studied to procure the best ones. Power losses were brought down to 7% when PV panels were cleaned fortnightly, which is the most feasible interval in terms of balance between cleaning cost and energy wasted due to soiling.



Proposed Approach for Experimental Analysis of Dust Composition Impact on Photovoltaic Panel Performance.

The International Journal of Management Education
Badruddin (2024) 22(2):100984

Impact of Demographic Profile on Sustainability Learning: A Management Education Students' Survey

Aisha Badruddin

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I.F. 6.0

Purpose : The specific objective of the research is to analyze the impact of academic level, year of study, age group and gender on cognitive learning, socio-emotional learning, behavioural learning and overall sustainability learning.

Methodology : A sample of 389 management students were considered for the current study. The study incorporates multiple regression technique using SPSS software and structure equation modeling employing AMOS 26 software. For analyzing reliability Cronbach's alpha is used and further the construct validity is established via confirmatory factor analysis and for assessing discriminant validity Heterotrait-Monotrait ratio of correlations (HTMT) is employed.

Findings : The overall sustainability learning which has been calculated from the cognitive, socio-emotional and behavioural learning scores is found to be positively impacted by the demographic variables age group and is negatively impacted by the academic level.

Practical implications : This study suggests that the educational programmes or initiatives must be specifically designed to induce sustainability learning based on gender and age-groups. Industry specific sustainability initiatives can be included in the curricula of professional educational programmes.

Originality/value : There is a dearth of studies in measuring the impact of age group, gender, level and year of study on attainment of sustainability learning objectives in terms of cognitive, socio-emotional, and behavioural learning on professional education students especially in India.

Environmental Science and Pollution Research
Mumtaj et al., (2024) 31(9):12856-70

Removal of pharmaceutical contaminants from hospital wastewater using constructed wetlands: a review

Zeba Ali Mumtaj1 · Abdul Rahman Khan1 · Majed Alsubih2 · Lotfi Aleya3, Roohul Abad Khan2 · **Saimah Khan1**

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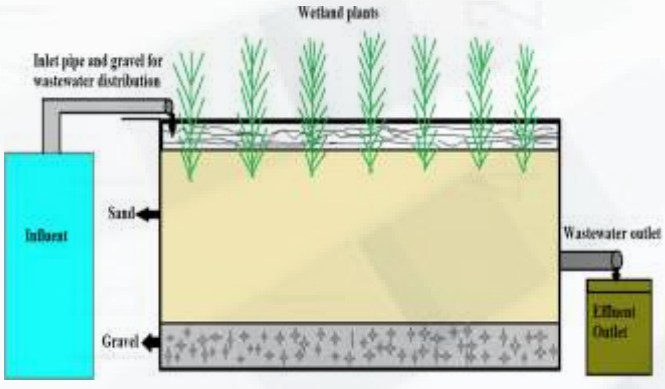
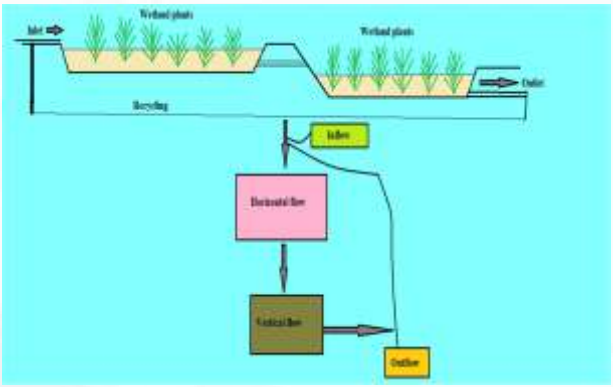
3 National Center of Scientific Research (6249) Franche-Comt. University, Besan.on, France

I.F. 5.8

Pharmaceutical compounds are a significant source of environmental pollution, particularly in hospital wastewater, which contains high concentrations of such compounds. Constructed wetlands have emerged as a promising approach to removing pharmaceutical compounds from wastewater. This paper aims to review the current state of knowledge on the removal of pharmaceutical compounds from hospital wastewater using constructed wetlands, including the mechanism of removal, removal efficiency, and future prospects. Pharmaceutical contaminants have been considered to be one of the most emerging pollutants in recent years. In this review article, various studies on constructed wetlands are incorporated in order to remove the pharmaceutical contaminants. The nature of constructed wetland can be explained by understanding the types of constructed wetland, characteristics of hospital wastewater, removal mechanism, and removal efficiency. The results of the review indicate that constructed wetlands are effective in removing pharmaceutical compounds from hospital wastewater. The removal mechanism of these compounds involves a combination of physical, chemical, and biological processes, including adsorption, degradation, and uptake by wetland plants. The removal efficiency of constructed wetlands varies depending on several factors, including the type and concentration of pharmaceutical compounds, the design of the wetland system, and the environmental conditions. Further research is necessary to optimize the performance of these systems, particularly in the removal of emerging contaminants, to ensure their effectiveness and long-term sustainability.



Horizontal flow constructed wetland



Hybrid flow-constructed wetland

Journal of Alloys and Compounds
Khatoon et al., (2023) 961:171125

La^{3+} substituted Ni0.5 $Co_{0.5}$ Fe_2O_4 nanoferrites: Magnetically separable catalysts for sunlight-driven photo-oxidative degradation of Methylene Blue

Tahira Khatoon[a], Vishal Singh Chandel[b], Navshad Alam[c], Ameer Azam[d], Seema Srivastava[a], **Salman Khan**[e]

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[b]*Department of Applied Science and Humanities, Rajkiya Engineering College, Ambedkarnagar 224122, Uttar Pradesh, India*
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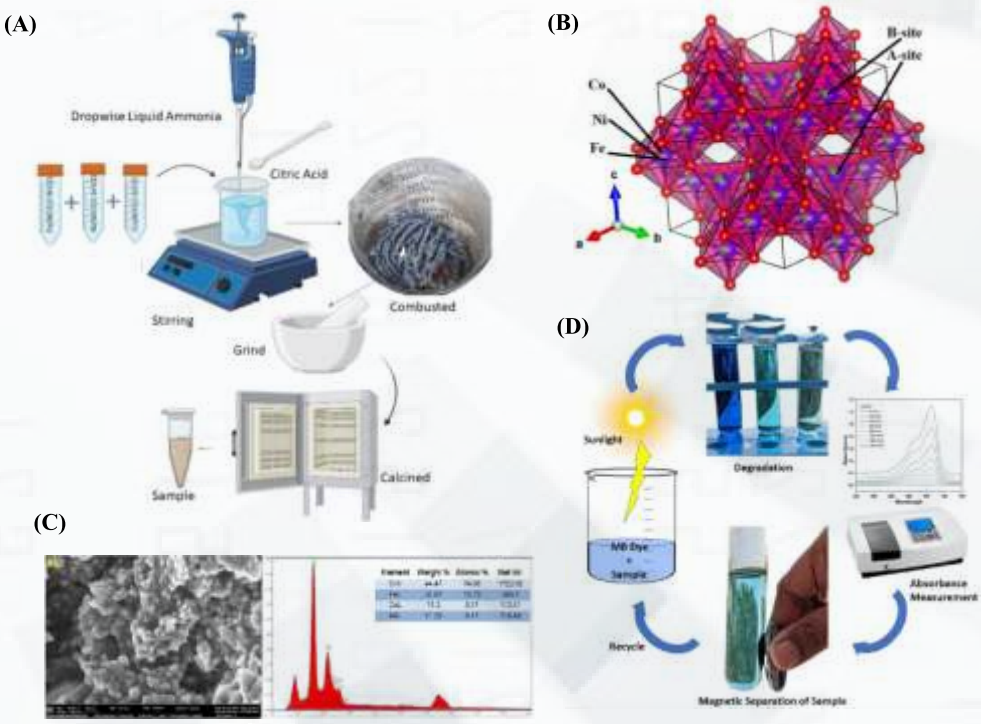
I.F. 5.8

LaxNi0.5Co0.5Fe2−xO4 nanoparticles (x = 0.0, 0.03, 0.06, 0.09, 0.12) were investigated in the current work as Methylene Blue degradation catalysts. Using the citrate-aided sol-gel auto-combustion approach, the nanoferrites with homogenous size distribution were produced. Powder X-ray diffraction was used to analyse the structure of the material. The optical characteristics of ferrite nanoparticles were investigated using diffused UV–visible reflectance spectroscopy. It was noted that when the concentration of La3+ increased, the band gap of produced ferrites shrank. Morphological and compositional studies were performed by FE-SEM and EDX spectra. Surface area was depicted using BET analysis. Raman Spectroscopy was used to estimate the parameters of vibration. Testing has been done on synthesized nanoferrites to see whether they can remove Methylene Blue's concentration in water. In addition, it was examined how La3+ incorporation in Ni0.5Co0.5Fe2O4 nanocomposites resulted in aspects of doping ratio, reaction time and amount of catalyst. The most effective material, La0.06Ni0.5Co0.5Fe1.94O4, achieved a 98.69 per cent efficiency in 140 min. Due to three positive characteristics, including high recycling (up to five cycles), stability, and simplicity of separation using an external magnet, toxic dyes in actual wastewaters can be photodegraded in sunlight using La3+ substituted Ni0.5Co0.5Fe2O4 nanoferrites as an efficient and competitive catalyst.



Sunlight-driven photo-oxidative degradation of Methylene Blue

Environmental Science and Pollution Research
Ranjan et al., (2024) 31(11):17494-17510

Valorization of sugarcane bagasse with in situ grown MoS2 for continuous pollutant remediation and microbial decontamination

Rahul Ranjan[1] · Smruti B. Bhatt[1] · Rohit Rai[1] · Sanju Kumari Sharma[1] · **Muskan Verma**[2] · Prodyut Dhar[1]

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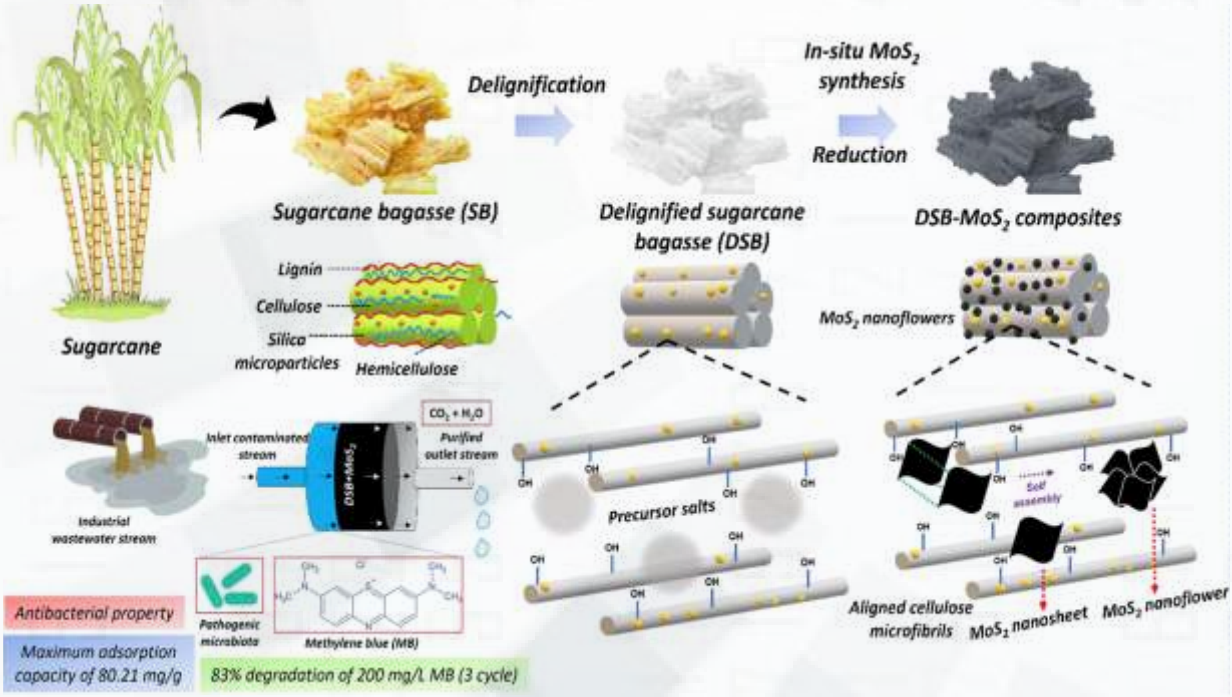
I.F. 5.8

In this study, sugarcane bagasse (SB) was strategically subjected to a delignification process followed by the in situ growth of multi-layered molybdenum disulfide (MoS2) nanosheets with hexagonal phase (2H-phase) crystal structure via hydrothermal treatment. The MoS2 nanosheets underwent self-assembly to form nanoflower-like structures in the aligned cellulose inter-channels of delignified sugarcane bagasse (DSB), the mechanism of which was understood through FTIR and XPS spectroscopic studies. DSB, due to its porous morphology and abundant hydroxyl groups, shows remediation capabilities of methylene blue (MB) dye through physio-sorption but shows a low adsorption capacity of 80.21 mg/g. To improve the removal capacity, DSB after in situ growth of MoS2 (DSB-MoS2) shows enhanced dye degradation to 114.3 mg/g (in the dark) which further improved to 158.74 mg/g during photodegradation, due to catalytically active MoS2. Interestingly, DSBMoS2 was capable of continuous dye degradation with recyclability for three cycles, reaching an efficiency of > 83%, along with a strong antibacterial response against Gram-positive Staphylococcus aureus (S.aureus) and Gram-negative Escherichia coli (E. coli). The present study introduces a unique strategy for the up-conversion of agricultural biomass into value-added bio-adsorbents, which can effectively and economically address the remediation of dyes with simultaneous microbial decontamination from polluted wastewater streams.



Schematic illustration for processing of DSB wastes through strategic delignification followed by in situ growth of MoS2 nanosheets, which self-assembles into nanoflower-like architecture for simultaneous dye adsorption, photodegradation, and microbial decontamination

Environmental Science and Pollution Research
Khan et al., (2024) 31(34):46806-46819

Reviewing the role of microplastics as carriers for microorganisms in absorbing toxic trace elements

Saimah Khan[1] · Zeba Ali Mumtaj[1] · Abdul Rahman Khan[1] · Meshel Qablan Alkahtani[2] · Enis Aleya[3] · Maxime Louzon[4] · Lotfi Aleya[3]

*1 **Department of Chemistry, Integral University, Lucknow, India***
2 Department of Civil Engineering, College of Engineering, King Khalid University, Abha, Saudi Arabia
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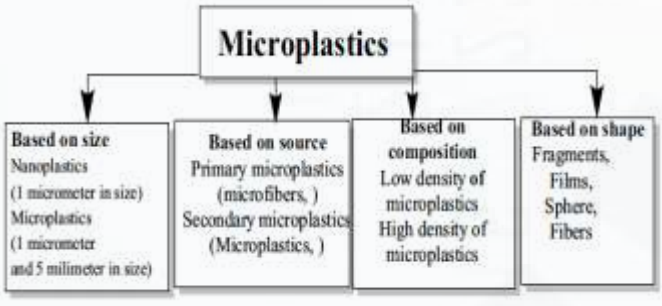
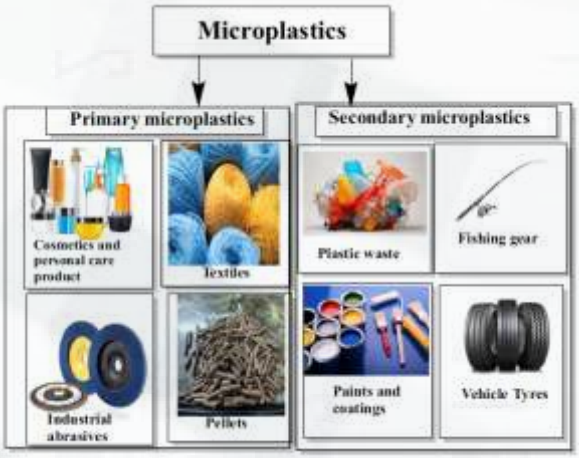
I.F. 5.8

The pervasive presence of microplastics in various settings, such as freshwater and marine ecosystems, has sparked serious concerns. Microplastics can operate as possible transporters for hazardous trace elements or microbes, even though they are not naturally able to actively absorb these compounds. The binding sites on the plastic's surface or the complexes that are formed with the organic material on the plastic are how this adsorption process takes place. Microplastics' surfaces also seem to be attractive to microorganisms, such as bacteria and algae. Microorganisms can adhere to the rough surface of microplastics, which facilitates their colonization and formation of biofilms. Numerous bacteria, including ones that have the ability to absorb hazardous trace elements, can be found in these biofilms. Microplastics and microbes can interact in ways that are advantageous and detrimental. Microplastics have the ability to act as a substrate for microbial growth, which could lead to an increase in the quantity of microorganisms in the surrounding environment. On the other hand, microplastics may make it easier for microbes to spread to new areas, which could help dangerous or deadly species proliferate. Research is still ongoing to determine the degree to which microplastics serve as carriers of microbes and hazardous trace elements. Comprehending the implications of microplastics, pollutants, and microorganisms in a variety of environmental conditions is difficult due to their complex interplay. This review provides a detailed description of the complexity of the problem and
used the examples related to microplastics, its environmental effects, and impacts on human health.



Types of microplastics in the environment



Sources of microplastics

Journal of Alloys and Compounds.
Jabeen et al., (2024) 984:174020

A novel green synthesis of $CuFe_2O_4$ Nanoparticles from Cissus rotundifolia for photocatalytic and antimicrobial activity evaluation

Sabeeha Jabeen [a,b], Vasi Uddin Siddiqui [c], **Swati Sharma** [d], **Smita Rai** [d], Pratibha Bansal [b], Shashi Bala [b], Azam Raza [c], Mohammad Imran Ahmad [a], Abdul Rahman Khan [a], Tahmeena Khan [a,*]

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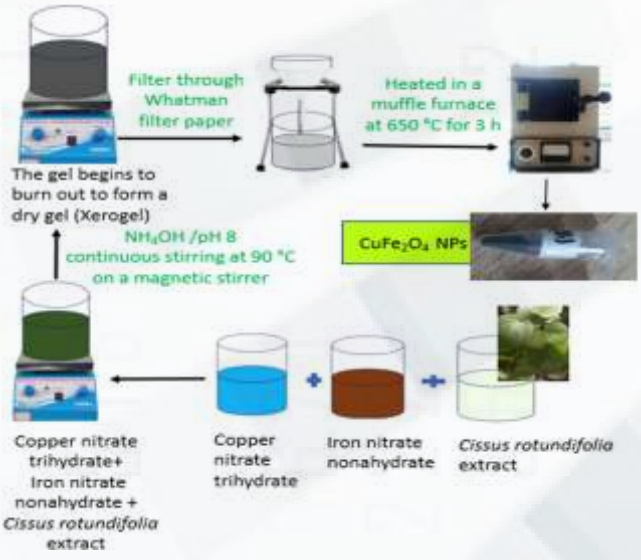
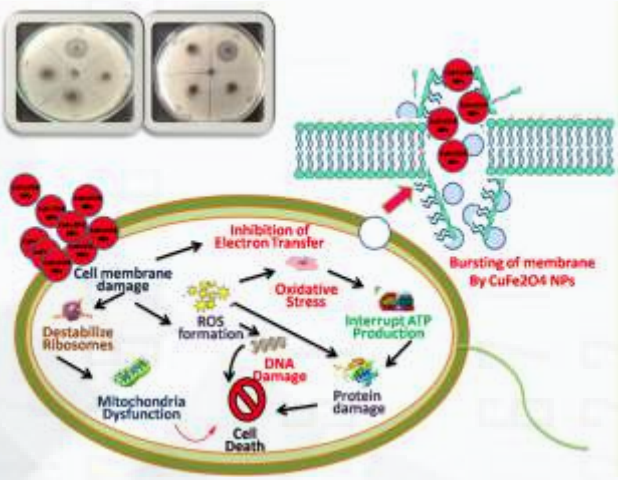
d Department of Biosciences, Integral University, Lucknow, Uttar Pradesh 226026, India
e Interdisciplinary Nanotechnology Centre, Zakir Husain College of Engineering and Technology, Aligarh Muslim University, Aligarh, Uttar Pradesh 202002, India

I.F. 5.8

This paper reports a novel green fabrication of copper ferrite (CuFe2O4) nanoparticles (NPs) from Cissus rotundifolia plant extract. The NPs were characterized by different spectroscopic techniques. The Fourier transform infrared (FT-IR) spectrum exhibited intrinsic stretching at the tetrahedral position of Fe–O at 591 cm-1 and the octahedral stretching of Cu–O at 402 cm 1 respectively. The fine diffraction pattern in the X-Ray diffraction analysis (XRD) showed the formation of well-crystalline NPs. The mean crystallite size of the NPs was calculated to be 17.33 nm. The High-resolution Transmission Electron Microscopic (TEM) analysis showed roughly spherical shape and irregular morphology of the NPs. The Zeta potential was calculated to be - 29.7±0.3 mV, indicating a negative charge over the CuFe2O4 NPs. The formation of spinel ferrite was confirmed from the characterization data. The photocatalytic activity of the CuFe2O4 NPs was examined against the methylene blue (MB) dye, showing 82% degradation under UV–Visible light. The reusability experiment showed that the catalytic activity was not much decreased even till the 4th cycle. The antibacterial activity of the synthesized CuFe2O4 NPs was tested against Bacillus subtilis, Staphylococcus aureus, Bacilus pumilis, Escherichia coli, Pseudomonas aeruginosa, and Salmonella abony through the Agar well diffusion method. A zone of inhibition of 12±0.2, and 11±0.4 mm was obtained against Bacillus subtilis and Bacillus pumilis, whereas against E. coli, P. aeruginosa and S. abony it was found to be 14±0.4, 18±0.3, and 12±0.2 mm respectively at 75 mg/mL dose, showing appreciable antibacterial activity.



Synthesis of CuFe2O4 NPs from Cissus roundifolia plant extract.



Probable mechanism involved in antibacterial activity.

Food Control
Shafi et al., (2024) 165:110693

Carbon dots-nanosensors: Advancement in food traceability for a sustainable environmental development

Zaryab Shafi [a], Vinay Kumar Pandey [b,*], **Rahul Singh** [c,**], Sarvesh Rustagi [d]

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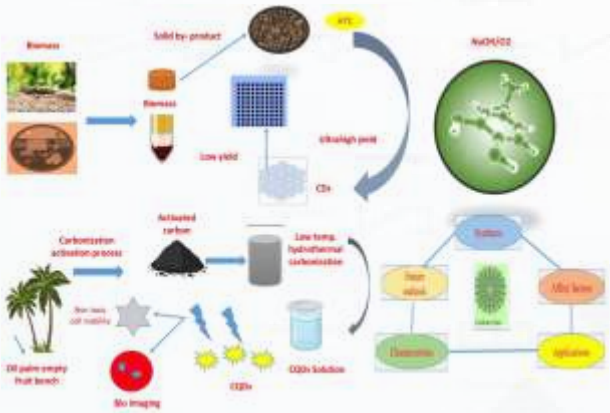
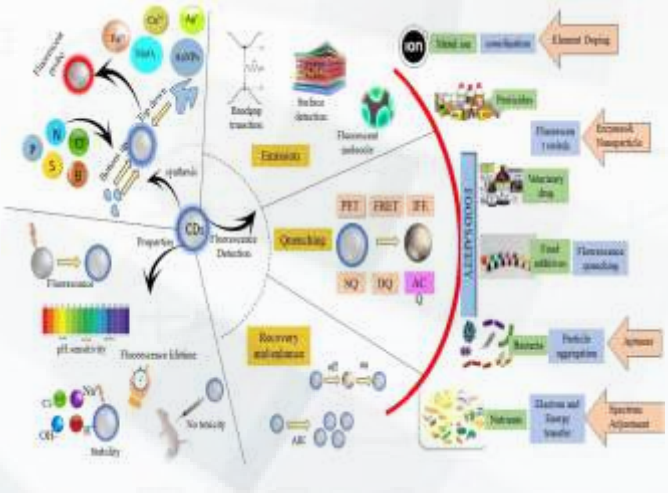
b Research & Development Cell, Biotechnology Department, Manav Rachna International Institute of Research and Studies (Deemed to Be University), Faridabad, 121004, Haryana, India
c Department of Bioengineering, Integral University, Lucknow, Uttar Pradesh, India
d Department of Food Technology, School of Applied and Life Sciences, Uttaranchal University, Dehradun, Uttarakhand, India

I.F. 5.6

The increasing complexity of global food networks and the possible hazards of fraud, foodborne diseases, and environmental damage highlight the need for strong food traceability systems. Nanoscale carbonaceous materials known as 'carbon dots' (CDs), have attracted interest due to their special optical qualities, biocompatibility, and capacity for surface functionalization. Due to these characteristics, Carbon Dots are perfect candidates for the creation of nanosensors that can track and identify indications at every stage of the manufacturing and distribution of food. Innovative solutions are required since conventional systems frequently fail to provide comprehensive and real-time information throughout the food supply chain. There are many different uses for Carbon Dots-based nanosensors in food traceability applications. These nanosensors can be designed to track the origins of food items, detect viruses, identify counterfeit goods, and monitor storage conditions. They are a vital tool for guaranteeing the security, authenticity, and quality of the food supply because of their great sensitivity, selectivity, and quick reaction. The overall objective of sustainable development is in line with the ecologically friendly characteristics of Carbon Dots. Various types of Carbon Dots and their working mechanism has been described in this review.



Significance of CDs in biomass conversion.



Nanosensors: A visual exploration of revolutionary applications.

Journal of Hazardous Materials Advances
Ahmad et al., (2023) 391:123288

Insight into the adsorption thermodynamics, kinetics, and photocatalytic studies of polyaniline/SnS_2 nanocomposite for dye removal

Nafees Ahmad[a], Daraksha Bano[a], Sabeeha Jabeen[a], Naseem Ahmad[a], Arshad Iqbal[c], Waris[d], Abdul Hakeem Anwer[c], Changyoon Jeong[e]

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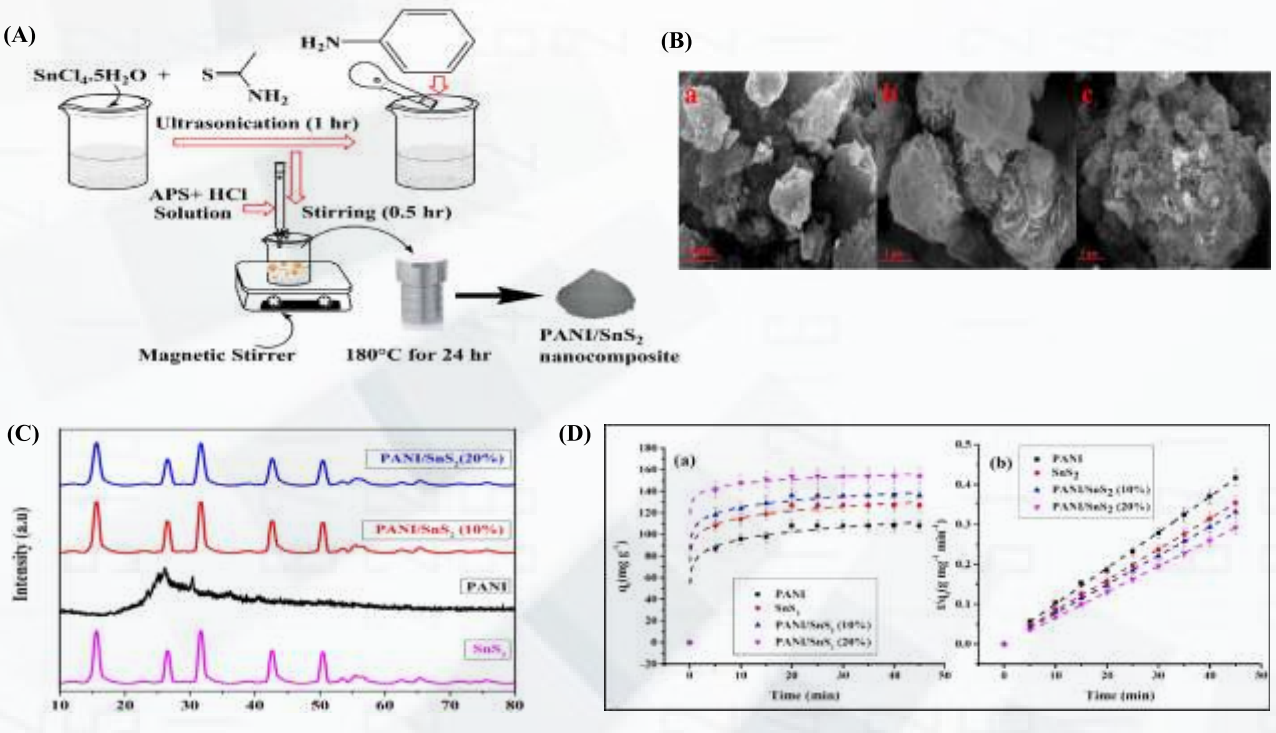
[b]*Department of Chemistry, IIT BHU, Varanasi 221005, India*
[c]*Department of Physics, Integral University, Lucknow 226026, India*
[d]*Industrial Chemistry Research Laboratory, Department of Industrial Chemistry, Aligarh Muslim University, Aligarh 202002, India*
[e]*School of Mechanical Engineering, Yeungnam University, Gyeongsan, Gyeongbuk 38541, Republic of Korea*

I.F. 5.4

The study aims to address the synthesis, the kinetics of adsorption, and photocatalytic application of Polyaniline/tin sulfide (PANI/SnS_2) nanocomposite against brilliant blue (BB) dye. PANI/SnS_2 was prepared by in-situ polymerization of the aniline to which hydrothermally synthesized SnS2 was added. Adsorption thermodynamics and kinetics of PANI/SnS_2 were discussed against the BB dye using Langmuir and Freundlich adsorption isotherm. Maximum adsorption capacity (qm) and adsorption equilibrium constant (K) were found to be 165.2 mg g^{-1}, and 0.027 min^{-1}. Moreover, Adsorption kinetics were studied by the pseudo-first and second-order reactions. The adsorption rate constant k1 and diffusion rate constant k_2 were found to be 0.1274 and 0.0233 min−1. PANI and SnS_2 with tunable band gap energy, adsorption, and redox property exhibited excellent activity towards the photodegradation of BB dye. The effect of heterojunction between PANI/SnS2 was observed by an increased rate of transfer of electrons. The rate constant was highest in the case of PANI/SnS2 (20%), which is 0.0172 min−1 and a maximum of 96.2% of BB dye was degraded in 45 min. The hydroxyl (•OH) and superoxide (•O_2−) radicals were generated during photocatalysis that degrades the BB dye into nontoxic products, which were confirmed by the trapping experiment. The obtained results indicate the excellent adsorption and photocatalytic activity of PANI/SnS_2 nanocomposite.



Polyaniline/SnS2 nanocomposite for dye removal

Journal of Molecular Liquids
Manikandan et al., (2024) 405:125064

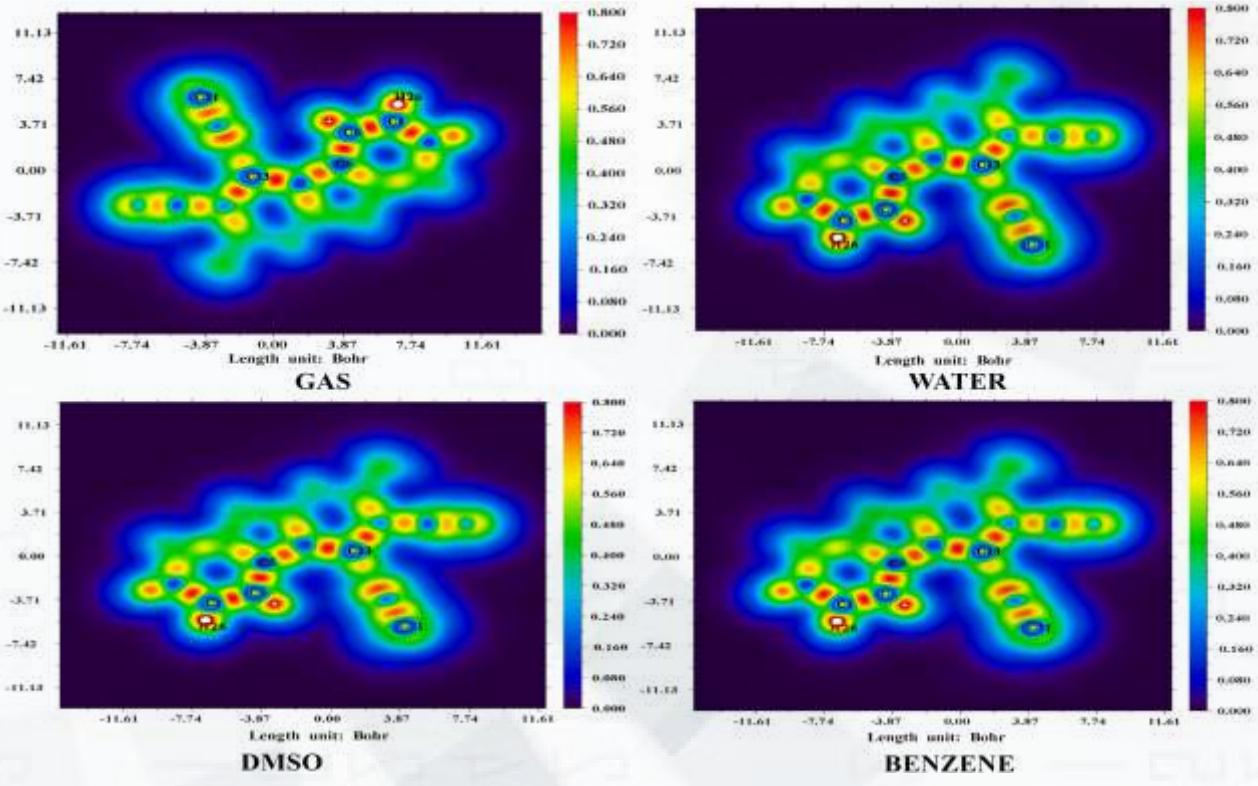
Solvent solute interaction (IEFPCM model), Michael addition-based anticancer drug synthesis, FTIR, NMR, and UV–visible investigations of spirooxindole-pyranoindole (2AIPC) - in vitro and in silico anti-cancer activity

P Manikandan[a], M. Kumar[a], P. Swarnamughi[a], **Mohd Asif[b,*]**, Malik Nasibullah[b], V.S. Jeba Reeda[c], Jamal M Khaled[d], S. Muthu[a,*]

a Department of Physics, Aringar Anna Govt. Arts College, Cheyyar 604407, Tamilnadu, India
b Medicinal Chemistry Laboratory-IIRC, Department of Chemistry, Integral University, Lucknow, India
c Department of Physics and Research Centre, Women's Christian College, Nagercoil 629 001, Tamil Nadu, India
d Department of Botany and Microbiology, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia

I.F. 5.3

Herein, click chemistry was chosen to synthesize 2AIPC using Knoevenegel and Michael addition reactions. In this synthesis, Lewis base was attracted by the generation of sp3 hybridized carbanion at active methylene group in the reactants for propagation reaction proceeding towards conducting the Michael addition product. The synthesized 2AIPC was characterized by NMR(13C and 1H), UV, FTR and FT-IR analytical tools; it was also evaluated utilizing density functional theory. According to DFT analyses, the comparative study of the functional groups of 2AIPC molecule was successfully described using Raman and FT-IR spectra with simulated spectra. NLO behaviour and charge exchange utilizing the hyperpolarizability and FMO band gap characteristics were also investigated. Through computational studies using MEP, FUKUI, RDG, and NBO, intermolecular interaction and the reactive area of the synthesized molecule were demonstrated. Moreover, the anticancer activity under the in-vitro analysis was tested, and the molecule showed 61.04 % GI against the K-562 leukemia cells at 10-5 M. Molecular docking also evaluated cytotoxicity by in silico study against leukemia-related proteins (60QN, 6OQC, 1EMR, and 606F). The docked complexes showed binding affinities of - 7.82, - 7.1, - 6.9, and - 6.71 kcal/mol. A nucleophile elimination process at 2AIPC's main amino group may also increase the molecule's potential to be a more effective lead medication.



LOL map of 2AIPC with various Solvents.

Journal of Molecular Liquids
Shamina et al., (2023) 391:123288

Synthesis, characterization, pharmaceutical evaluation, molecular docking and DFT calculations of a novel drug (E)-5-bromo-3-(phenylimino) indolin-2-one

Herlin Shamina [a,c], V. Bena Jothy [b,c,*], Mohd Asif [d], **Malik Nasibullah** [d], Naiyf S. Alharbi [e], Ghulam Abbas[f], S. Muthu [g,*]

a Research Scholar, Register Number: 20213282132011, Department of Physics and Research Centre, Women's Christian College, Nagercoil 629 001, Tamil Nadu, India
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f Institute of Inorganic Chemistry, Karlsruhe Institute of Technology, Engesserstr 15, 76131 Karlsruhe, Germany
g Department of Physics, Arignar anna Govt. Arts College, Cheyyar 604 407, Tamilnadu, India

I.F. 5.3

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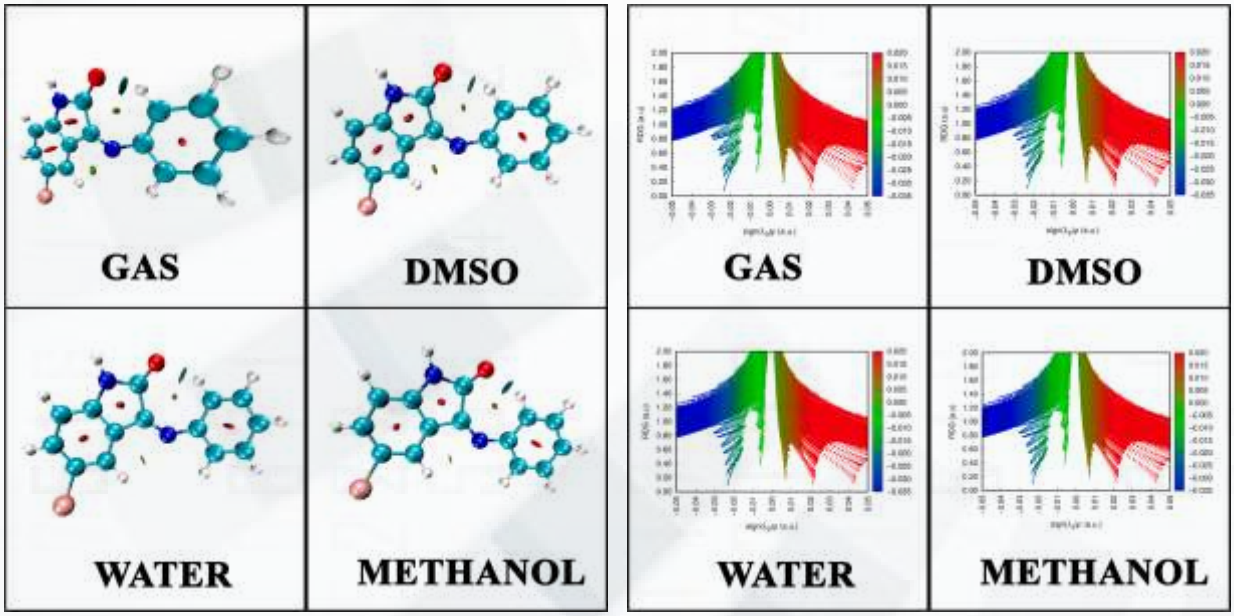
Moreover, the anticancer activity under the in-vitro analysis was tested, and the molecule showed 61.04 % GI against the K-562 leukemia cells at 10-5 M. Molecular docking also evaluated cytotoxicity by in silico study against leukemia-related proteins (60QN, 6OQC, 1EMR, and 606F). The docked complexes showed binding affinities of - 7.82, - 7.1, - 6.9, and - 6.71 kcal/mol. A nucleophile elimination process at 2AIPC's main amino group may also increase the molecule's potential to be a more effective lead medication.



Isosurface density plots illustrating the non-bonded interactions of 5BPI in different solvents.
2D scatter plots illustrating the non-bonded interactions of 5BPI in different solvents..

Journal of Molecular Liquids
Gupta et al., (2024) 405:125111

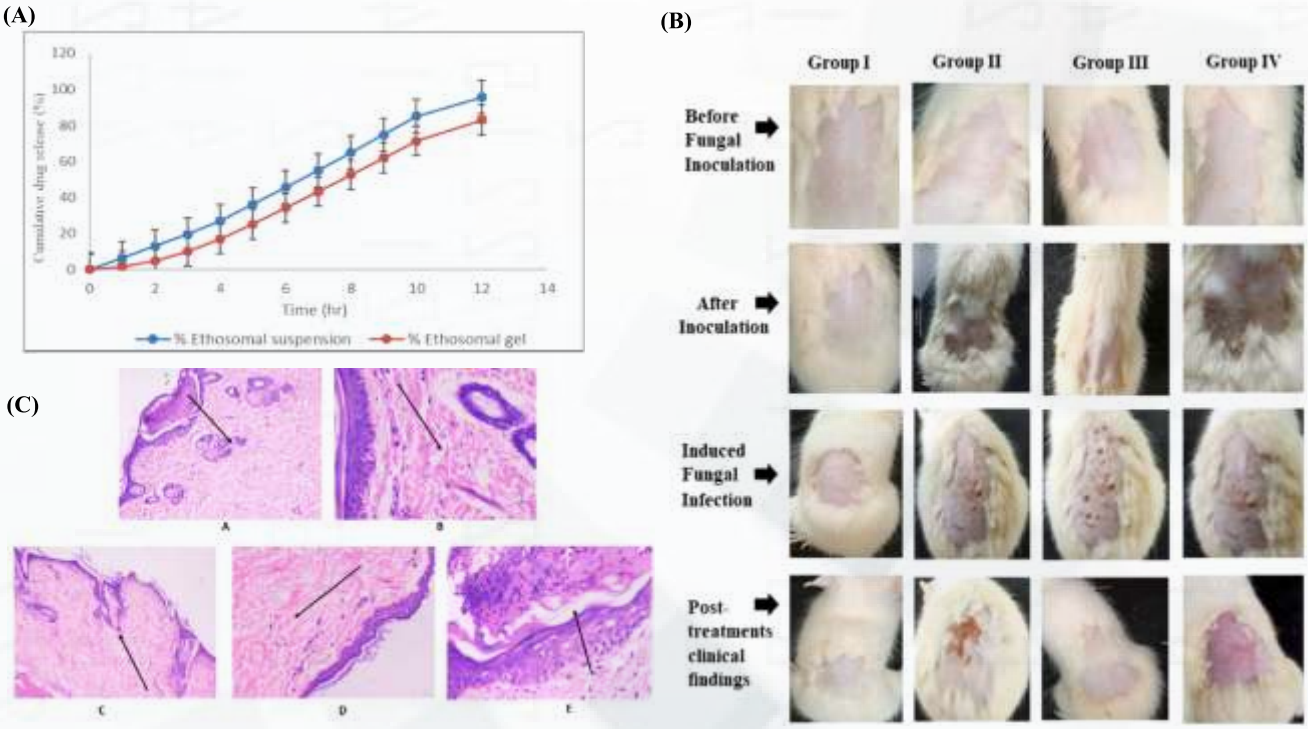
Development and characterization of topical ethosomal gel for improved antifungal therapeutics

Preeti Gupta, Poonam Kushwaha, Abdul Hafeez

Faculty of Pharmacy, Integral University, Lucknow

I.F. 5.3

The present study aimed to develop Eberconazole nitrate (EBZ)-loaded ethosomes using Central Composite Design (CCD) by the cold method. The three-factor CCD model was implemented to investigate the effect of variables on ethosome characteristics and performance. For CCD modelling, dependent and independent variables were chosen. The percentage of soy phosphatidylcholine (PC) (X1; % w/v), ethanol (X2; % v/v), and PROPYLENE glycol (PG) (X3; % v/v) were designated as independent variables. However, the dependent variables were particle size (Y1; nm), polydispersity index (PDI) (Y2), and encapsulation efficiency (EE) (Y3; %). The level of independent variables was changed to produce a total of 17 batches (F1-F17). Formulation code F2 with particle size; 227.9 nm, PDI; 0.160 and % EE; 90 ± 0.34 % was selected as the optimized batch. The optimized batch was further incorporated into the hydrogel matrix and investigated for several physicochemical parameters. When compared to the free drug-loaded hydrogel, the ethosomes-loaded hydrogel demonstrated controlled EBZ release with higher skin permeation and skin retention of EBZ. The assessment of antifungal efficacy of the developed formulation was carried out by in vivo animal model method. In vivo studies demonstrated that EBZ loaded ethosomal gel may alleviate fungal infection caused by a resistant strain of Candida albicans. The study showed satisfactory results, which suggest the suitability of the developed formulation for the effective treatment of fungal infection.



Improved antifungal effects of a topical ethosomal gel

Arabian Journal of Chemistry
Ahmad et al., (2024) 17(1):105441

Antioxidant, α-amylase and acetylcholinesterase inhibitory potential of Mazus pumilus (Japanese Mazus) extract: An in-vitro and in-silico study

Saheem Ahmad[a,*], Sultan Alouffi[a], Uzma Shahab[b], Naif K. Binsaleh[a,c], Mohamed E. Ghoniem[d], Rihab Akasha[a], Mohammad Kaleem Ahmad [b], Naved Ahmad [e,f], **Mohd. Waiz**[f], **M. Salman Khan**[f]

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b Department of Biochemistry, King George Medical University, Lucknow, U.P., India
c Medical and Diagnostic Research Centre, University of Ha'il, Hail 55476, Saudi Arabia
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e College of Applied Sciences, AlMaarefa University, Riyadh 13713, Saudi Arabia
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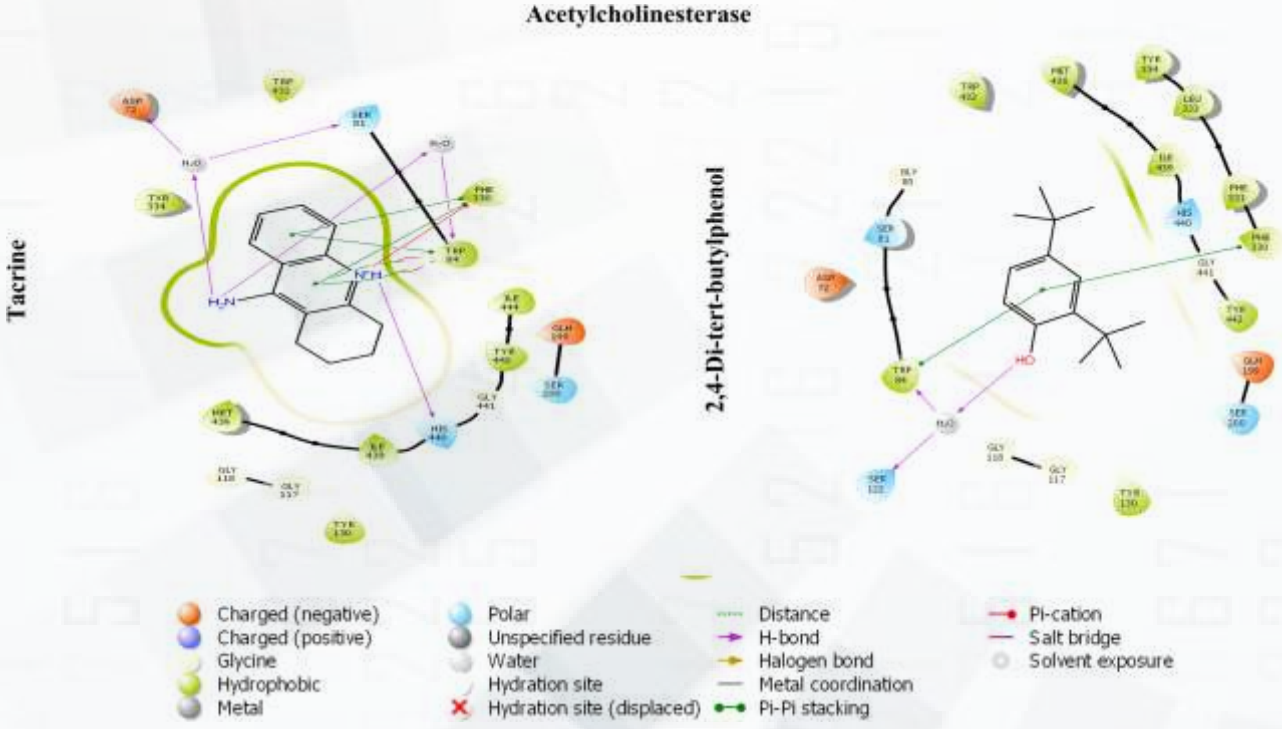
I.F. 5.3

Plant-derived secondary metabolites possess diverse biological activities that are beneficial to humans. Modern medications used for diabetes and Alzheimer's often cause side effects, prompting reliance on traditional alternatives. Therefore, we aimed to uncover the potential of *Mazus pumilus* in countering diabetes and Alzheimer's by *in-vitro* inhibition of α-amylase and AChE. Additionally, antioxidant activity and phytochemical analyses were performed. *Mazus pumilus*The plant was extracted sequentially using n-hexane, ethyl acetate, dichloromethane, methanol, and water. The methanolic fraction, notably, manifested marked antioxidant efficacy against DPPH and ABTS radicals. Subsequently, this extract evinces noteworthy inhibitory attributes against α-amylase and AChE, respectively, in a competitive manner. Moreover, the bioactive phytoconstituents present in the methanolicextracts were determined through GC–MS analysis, and subsequent computational molecular docking studies revealed that these compounds strongly bound to the active site of both α-amylase and AChE. The calculated least binding energies, for α-amylase and AChE, underscore the viability of the molecular interactions. In conclusion, the antioxidant, antidiabetic, and anti-Alzheimer attributes of *Mazus pumilus* extract likely emanate from the synergistic interplay of its bioactive phytoconstituents. A comprehensive *in-vitro* and *in-vivo* study is essential to fully explore the anti-diabetic and anti-Alzheimer potential of secondary metabolites of *Mazus pumilus*.



The 2D image represents the in-silico binding pattern of (A) Tacrine and (B) 2,4-Di-tert-butylphenol within the active pocket of AChE crystal.

Ceramics International
Khatoon et al., (2023) 50(4):7156-67

Exploring the synergistic effects of La^{3+} substitution on dielectric performance of manganese cobalt ferrite: Implications for advanced electronic applications

Tahira Khatoon[a], Navshad Alam[b], Vishal Singh Chandel[c], Ameer Azam[d], Seema Srivastava[a], Jhalak Gupta[c]

[a]***Department of Physics, Integral University, Dasauli, Kursi Road, Lucknow, 226026, Uttar Pradesh, India***
[b]*Department of Applied Science and Humanities, SR Institute of Management and Technology, Lucknow, 226201, Uttar Pradesh, India*
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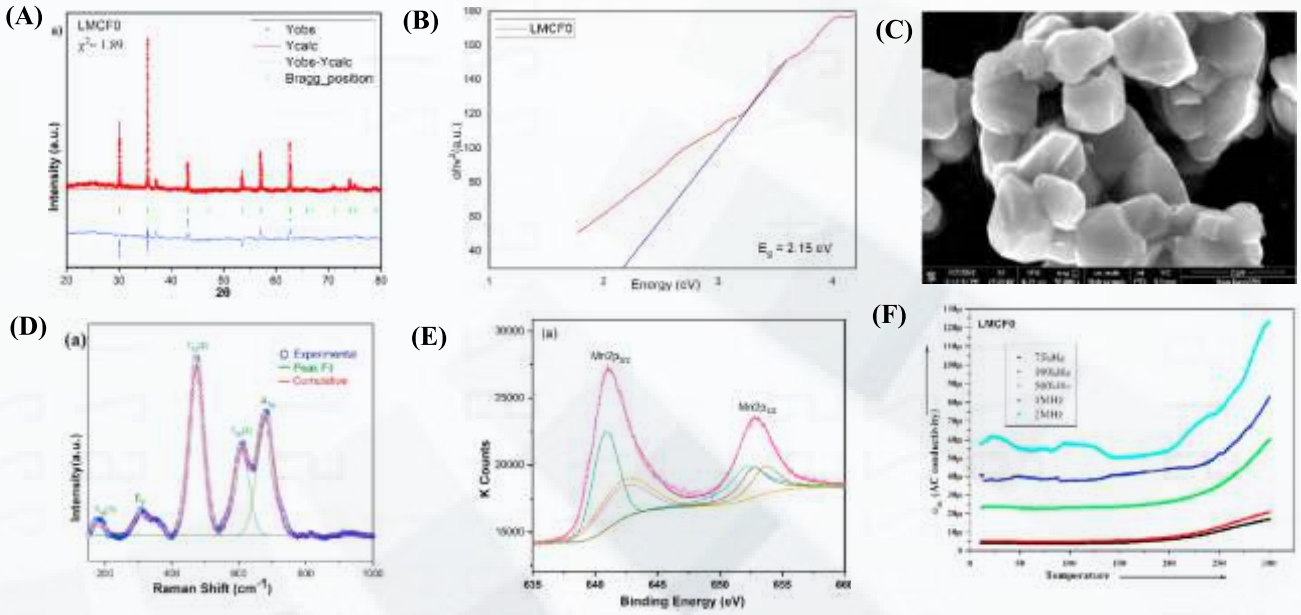
[d]*Department of Applied Physics, ZH College of Engineering and Technology, AMU, Aligarh, 202002, Uttar Pradesh, India*
[e]*Department of Physics, AMU, Aligarh, 202002, Uttar Pradesh, India*

I.F. 5.1

La^{3+} substituted $Mn_{0.5}Co_{0.5}Fe_2O_4$ ferrites were synthesized through sol-gel auto-combustion route. The impacts of varying doping concentrations (0.03, 0.06 and 0.09) were studied on synthesized samples' structural, optical, morphological, vibrational, and dielectric properties. The spinel cubic phase of synthesized samples was confirmed by X-ray diffraction (XRD) analysis; increased La^{3+} concentration has altered the structural parameters of prepared ferrites. Diffuse Reflectance Spectroscopy (DRS) shows a decrease in band gap with increasing concentration of La^{3+}. Morphology has been reviewed by Field Effect Scanning Electron Microscope (FE-SEM), and elemental composition was confirmed by Energy Dispersive X-ray (EDAX) spectra. In addition, M−O stretching bonds were verified employing Fourier Transform Infrared (FTIR) spectroscopy. Raman Spectroscopy shows five modes, further confirming the spinel structure. The XPS spectra verified the +2 oxidation state of Manganese. Finally, the dielectric constant, tangent loss, and AC (Alternating Current) conductivity were analyzed with temperature at several frequencies. The experimental results have unveiled intriguing findings: the dielectric constant exhibited its maximum value at the lowest frequency within the investigated range, and it demonstrated an increasing trend with the rising temperature at a specific frequency. Notably, introducing La^{3+} through substitution has led to a noteworthy enhancement in the dielectric constant, underscoring the novel impact of this dopant on the material's electrical properties. A positive correlation existed between AC conductivity and temperature; as the temperature increases, so does the AC conductivity. Also, it was found to be maximum at maximum frequency value for all samples. Additionally, it can be deduced that raising the La^{3+} concentration in crystal improves the dielectric characteristics of Manganese Cobalt ferrites.



Synergistic effects of La^{3+} substitution on dielectric performance of manganese cobalt ferrite

Colloids and Surfaces A: Physicochemical and Engineering Aspects
Rafi et al., (2023) 676(A):132148

Glycation derived AuNPs bioconjugated novel herbal drug isoferulic acid: As a potential anti-glycation, anti-diabetic and antineoplastic agent

Zeeshan Rafi[a], Mahvish Khan[b,c], Saif Khan[c,d], Manish Srivastava[e], Shafiul Haque[f], Sundeep S Bhagwath[c,d], Kurian Punnoose[c,g], **Mohd. Sajid Khan**[h]

[a]***Department of Bioengineering, Integral University, Lucknow - 226026, Uttar Pradesh, India***

[b]*Department of Biology, College of science, Ha'il University, Ha'il-2440, Saudi Arabia*

[c]*Medical and Diagnostic Research Centre, University of Ha'il, Hail 55473, Saudi Arabia*

[d]*Department of Basic Dental and Medical Sciences, College of Dentistry, Ha'il University, Ha'il-2440, Saudi Arabia*

[e]*Department of Chemical Engineering & Technology, Indian Institute of Technology (BHU), Varanasi, Varanasi-221005*

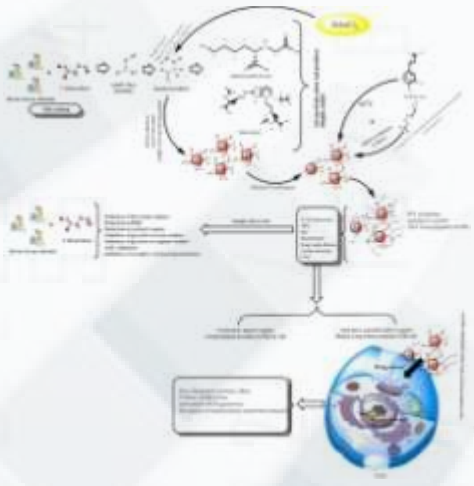
[f]*Research and Scientific Studies Unit, College of Nursing and Allied Health Sciences, Jazan University, Jazan-45142, Saudi Arabia*

[g]*Department of Oral and Maxillofacial surgery, College of Dentistry, Ha'il University, Ha'il-2440, Saudi Arabia*

[h]***Department of Biosciences, Integral University, Lucknow - 226026, Uttar Pradesh, India***

I.F. 4.9

Based on the significance and impact of serum protein glycation and the possibility that AGEs play a role in diabetes-related complications and cancer, this study examined the anti-glycation, anti-cancer, and α-amylase inhibition activities of isoferulic acid (IFA) and its gold nanoparticle (IFA-AuNPs) bioconjugated formulations. In comparison to the control (glycated) samples, IFA and IFA-AuNPs were found to show a significant reduction in the KM moieties, carbonyl content, and HMF content that were produced during the glycation, demonstrating that the glycation reaction generated less superoxide radicals, had fewer intermediates, and did not cause as many structural perturbations to BSA. The IFA and IFA-AuNPs treated samples had a higher proportion of unreacted lysine and arginine deposits than the control (glycated) samples, suggesting that the inhibitors prevented the association of negatively charged arginine deposits with 2′-Deoxyribose. Purified IFA (IC50 = 4.3 mM) decreased α-amylase activity insignificantly compared to acarbose (IC50 = 0.118 mM). Therefore, IFA may not be suited for targeting α-amylase. However, IFA and its analogs have been reported to inhibit several malignancies, including leukemia, breast, colon, and lung cancer. Therefore, the cytotoxicity study was conducted using human keratinocytes (HaCat cells), and the IC50 values for IFA and IFA-AuNPs were determined to be 6062.4 µM and 151.6 µM, respectively. Their cytotoxic effects on human lung cancer epithelial cells (A549), however, were estimated to be 5593 µM and 117.5 µM. Our study confirmed that IFA-treated A549 cells at a greater concentration (5593 µM) caused less disruption of mitochondrial membrane potential (ΔΨm) and production of ROS burst than IFA-AuNPs at a significantly lower concentration (117,5 µM). When ΔΨm was disrupted, Cyt-c-mediated apoptosis was elicited, which then allowed IFA and AuNPs to work synergistically to degrade DNA. It was discovered that IFA-AuNPs target cancer cells through different pathways, with AuNPs potentiating the effect of IFA.



AuNPs bio-conjugated novel herbal drug isoferulic acid

International journal of molecular sciences
Hussain et al., (2023) 24(20):15361

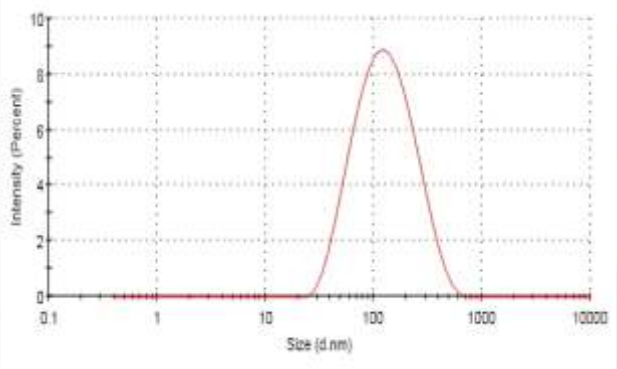
Hepatoprotective and Antioxidant Effects of Nanopiperine against Cypermethrin via Mitigation of Oxidative Stress, Inflammations and Gene Expression Using qRT-PCR

Sohail Hussain[1], Abdulmajeed M. Jali[1], Saeed Alshahrani[1], Khairat H. M. Khairat[1,2], Rahimullah Siddiqui[1], Mohammad Intakhab Alam[3], Raisuddin Ali[4], Manal Mohammed[5], **Andleeb Khan**[6], Hamad Al Shahi[1], Ali Hanbashi[1,7], Marwa Qadri[1,8] and Mohammad Ashafaq[1,*]

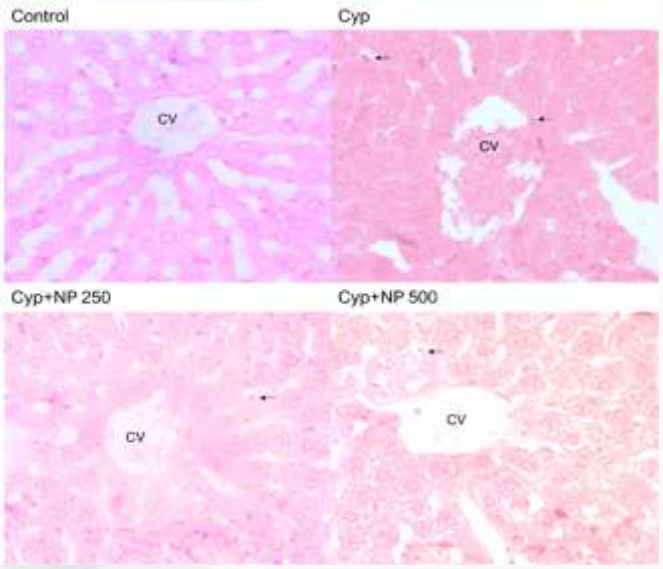
1 Department of Pharmacology and Toxicology, College of Pharmacy, Jazan University, Jazan 45142, Saudi Arabia;
2 Maternity and Children Hospital, Najran 66243, Saudi Arabia
3 Department of Pharmaceutics, College of Pharmacy, Jazan University, Jazan 45142, Saudi Arabia
4 Department of Pharmaceutics, College of Pharmacy, King Saud University, Riyadh 11451, Saudi Arabia
5 Substance Abuse Research Center (SARC), College of Pharmacy, Jazan University, Jazan 45142, Saudi Arabia
6 Department of Biosciences, Faculty of Science, Integral University, Lucknow 226026, India
7 Department of Pharmacology, University of Oxford, Mansfield Road, Oxford OX1 3QT, UK
8 Inflammation Pharmacology and Drug Discovery Unit, Medical Research Center (MRC), Jazan University, Jazan 45142, Saudi Arabia

I.F. 4.9

Cypermethrin (Cyp) is a pyrethroid that has been associated with the toxicity of various organs. The aim of our study was to evaluate the hepatoprotective and antioxidant activities of nanopiperine (NP) against Cyp toxicity. Cyp (50 mg/kg) was administered orally in all animals of groups III–VI for 15 days. Groups IV–VI each received three doses of NP (125, 250, and 500 g/kg/day) for 10 days after receiving the Cyp dosage, which was given after 1 h. A rise in serum biomarkers (ALT, AST, ALP, total protein, and albumin), which are indicators of toxicity alongside anomalous oxidative stress indices (lipid peroxidation (LPO), glutathione (GSH), superoxide dismutase (SOD) and catalase), was detected. After Cyp treatment, we observed upregulated cytokines, caspase expression, and histological analysis that the showed distortion of cell shape. However, the administration of NP dramatically reversed all of the Cyp-induced alterations, inducing reductions in serum marker levels, stress level, the production of cytokines, and caspase expression. Additionally, all of the histopathological alterations were minimized to values that were comparable to normal levels. The present findings suggested that NP exhibits potent antioxidant and anti-inflammatory activities that can protect rats' livers against Cyp-induced liver damage through hepatoprotective activities.



Particle size distribution of NP. Average particle size distribution (n = 1) of optimized formulations of NP.



Liver histology of control, Cyp-treated and Cyp + NP group.

International journal of molecular sciences
Khan et al., (2024) 42(15):8045-62

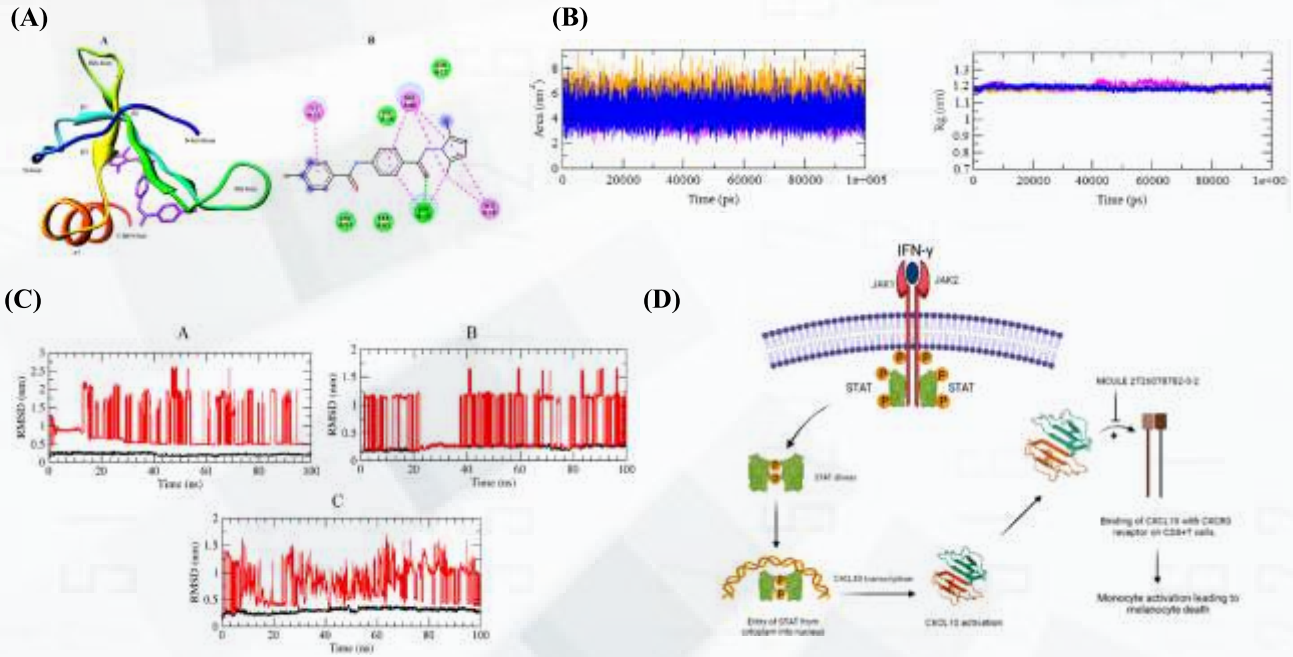
Identifying potential inhibitors of C-X-C motif chemokine ligand 10 against vitiligo: structure based virtual screening, molecular dynamics simulation, and principal component analysis

Mohammad Kalim Ahmad Khan[a], Sultan Alouffi[b] Saheem Ahmad[b]

[a]*Department of Bioengineering, Integral University, Lucknow, India*
[b]*Department of Medical Laboratory Sciences, College of Applied Medical Sciences, University of Hail, Hail, Saudi Arabia*

I.F. 4.9

The research aims to envisage small molecule inhibitors targeting the C-X-C motif chemokine ligand 10 (CXCL10) of the JAK/STAT pathway. CXCL10 plays a significant role in inducing auto-immunity in vitiligo through JAK/STAT pathway. To accomplish the aim, structure-based virtual screening with fundamental search limits, e.g., molecular weight (MW ≤ 500 Da), hydrogen bond donor (HBD ≤ 5), hydrogen bond acceptor (HBA ≤ 10), and lipophilicity (logP ≤ 5) was used to screen investigational molecules from MCULE database. The SBVS-ligand hits were sifted through toxicity profiling followed by filtration through the Brain or IntestinaL EstimateD-Egg model to check the human intestinal abortion and blood-brain barrier permeation based on two physicochemical properties, including topological surface area and WLOGP. The BOILED-Egg filtered compounds were passed through drug-likeness features other than Pfizer's Lipinski rule of five, viz., Ghose filters, Muegge filters, Egan parameters, and Veber filters, followed by medicinal chemistry's pan assay interference structure and Brenk alert investigation. Chemical compounds that comply with the above ADME descriptors were docked with target protein CXCL10 via AutoDock Vina. The stability of the top two ligand hits was assessed through dynamics simulations of 100 ns and principal component analysis and compared with the reference drugs Baicalein and EGCG. Based on the findings of Gibbs free energy of binding, ADME profiling, medicinal chemistry attributes depiction, root-mean-square deviation, root-mean-square fluctuation, solvent accessible surface area, the free energy of solvation, the radius of gyration, and PCA, MCULE2726078782-0-2 was found better than potential reference drug Baicalein.



Identifying potential inhibitors of C-X-C motif chemokine ligand 10 (CXCL10)

International journal of molecular sciences
Kitmo et al., (2023) 2023(1):6770322

Intelligent Approach for Control Techniques Based on Complex Converter Structures

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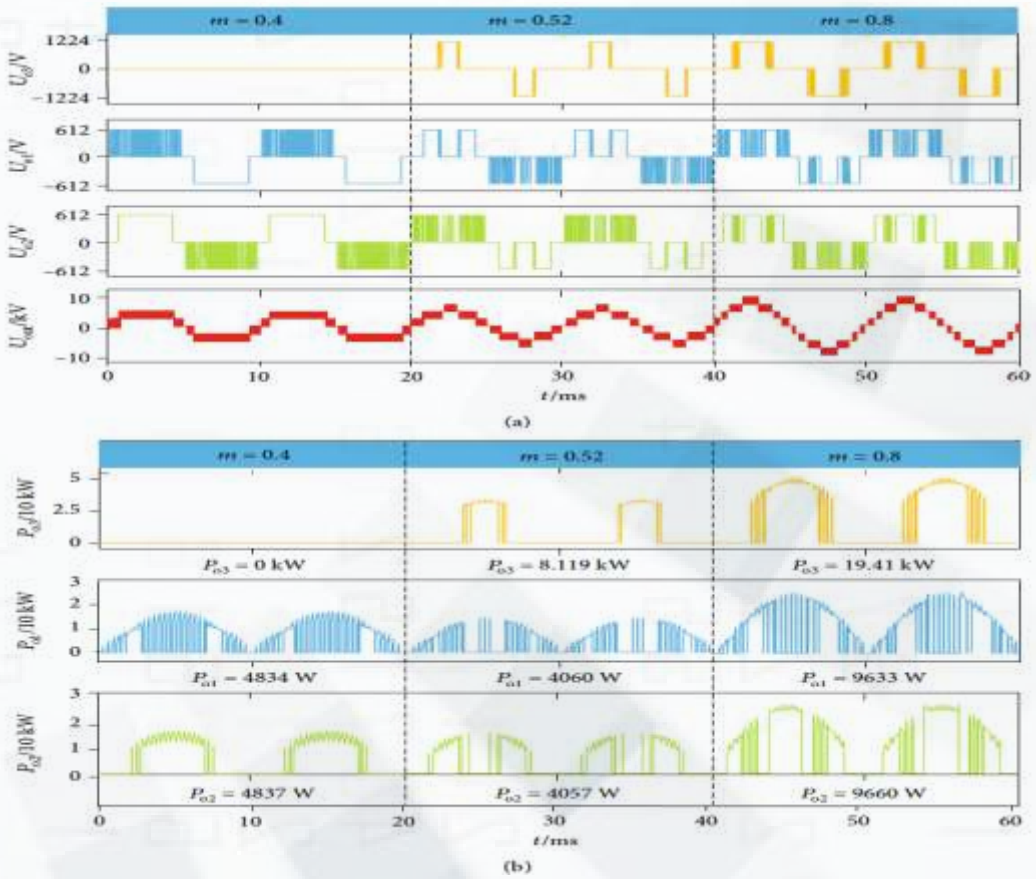
I.F. 4.9

Hybrid frequency control strategies are used to eliminate the problem of current inversion in multilevel cascaded asymmetrical H-bridge inverters. Unfortunately, this technique results in unbalanced power at the inverter output. The improved hybrid PWM modulation strategy helps to regulate power balances within a reasonable range at high and low voltages, by adjusting the conduction angle of the cells in high frequencies. However, as the conduction angle of a high-voltage cell increases, the fundamental amplitude of the inverter output voltage decreases, since waveforms with absolute values greater than 2E cannot
be perfectly modulated. Based on mathematical models of the conduction time for each level synthesis method, a new modulation strategy is proposed to solve the problems associated with the two strategies mentioned above. This new high-frequency modulation strategy adopts a combination of pulse-width modulation (PWM) and step modulation to combine control of the high-voltage and low-voltage units. At given intervals, the control voltage signals of the low-voltage unit are exchanged. Finally, the power of each unit is balanced and the basic amplitude of the inverter output voltage is not affected. Finally, the MATLAB/ Simulink simulation model and experimental platform verify the feasibility of this strategy.



Simulation results under new modulation strategy: (a) output voltage; (b) instantaneous output power.

International journal of molecular sciences
Hussain et al., (2023) 24(20):15361

MicroRNA-29b-3p degenerates terminally differentiated dopaminergic SH-SY5Y cells by perturbation of mitochondrial functions

Sana Sarkar[1,2], Anuj Pandey[1,3], Sanjeev Kumar Yadav[1], Pragati Raghuwanshi[4], **Mohammed Haris Siddiqui**[2], Saripella Srikrishna[3], Aditya Bhushan Pant[1], Sanjay Yadav[4]

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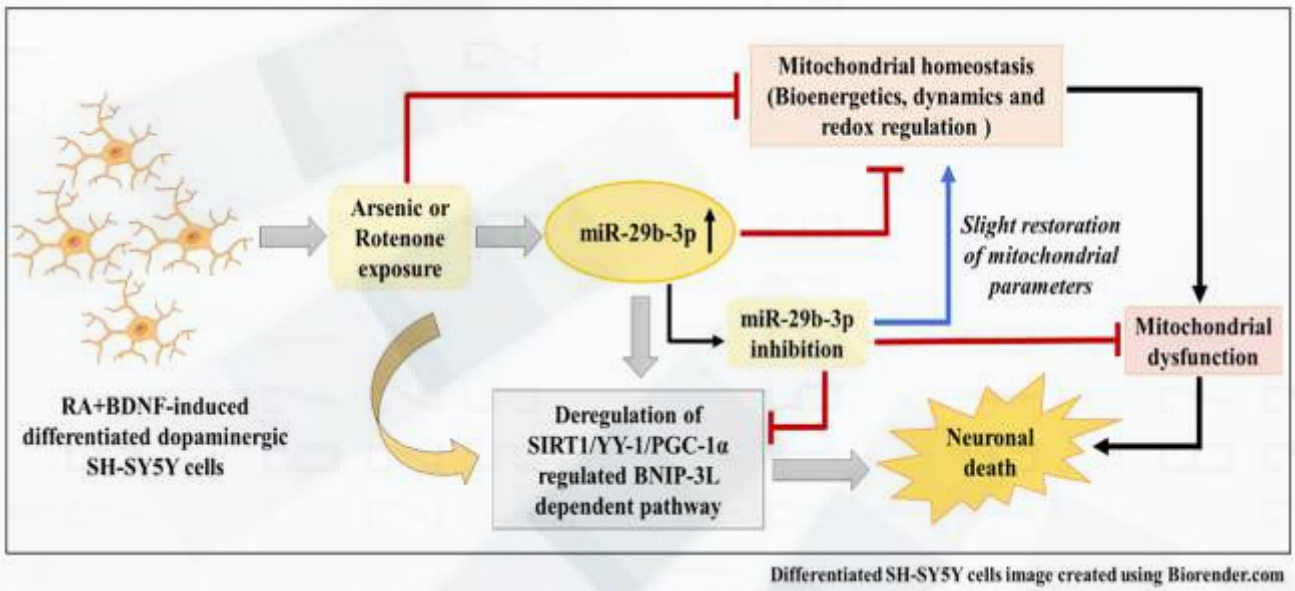
I.F. 4.9

Mitochondrial dysfunction is the main cause of gradual deterioration of structure and function of neuronal cells, eventually resulting in neurodegeneration. Studies have revealed a complex interrelationship between neurotoxicant exposure, mitochondrial dysfunction, and neurodegenerative diseases. Alteration in the expression of microRNAs (miRNAs) has also been linked with disruption in mitochondrial homeostasis and bioenergetics. In our recent research (Cellular and Molecular Neurobiology (2023) https://doi.org/10.1007/s10571-023-01362-4), we have identified miR-29b-3p as one of the most significantly up-regulated miRNAs in the blood of Parkinson's patients. The findings of the present study revealed that neurotoxicants of two different natures, that is, arsenic or rotenone, dramatically increased miR-29b-3p expression (18.63-fold and 12.85-fold, respectively) in differentiated dopaminergic SH-SY5Y cells. This dysregulation of miR-29b-3p intricately modulated mitochondrial morphology, induced oxidative stress, and perturbed mitochondrial membrane potential, collectively contributing to the degeneration of dopaminergic cells. Additionally, using assays for mitochondrial bioenergetics in live and differentiated SH-SY5Y cells, a reduction in oxygen consumption rate (OCR), maximal respiration, basal respiration, and non-mitochondrial respiration was observed in cells transfected with mimics of miR-29b-3p. Inhibition of miR-29b-3p by transfecting inhibitor of miR-29b-3p prior to exposure to neurotoxicants significantly restored OCR and other respiration parameters. Furthermore, we observed that induction of miR-29b-3p activates neuronal apoptosis via sirtuin-1(SIRT-1)/YinYang-1(YY-1)/peroxisome proliferator-activated receptor-gamma coactivator-1alpha (PGC-1α)-regulated Bcl-2 interacting protein 3-like-dependent mechanism. Collectively, our studies have shown the role of miR-29b-3p in dysregulation of mitochondrial bioenergetics during degeneration of dopaminergic neurons via regulating SIRT-1/YY-1/PGC-1α axis.



Role of microRNA-29b-3p in SH-SY5Y cell differentiation

Journal of Agriculture and Food Research
Chand et al., (2023) 14:100790

Numerical optimization of process parameters and quality stability of active edible coated jaggery cubes during storage

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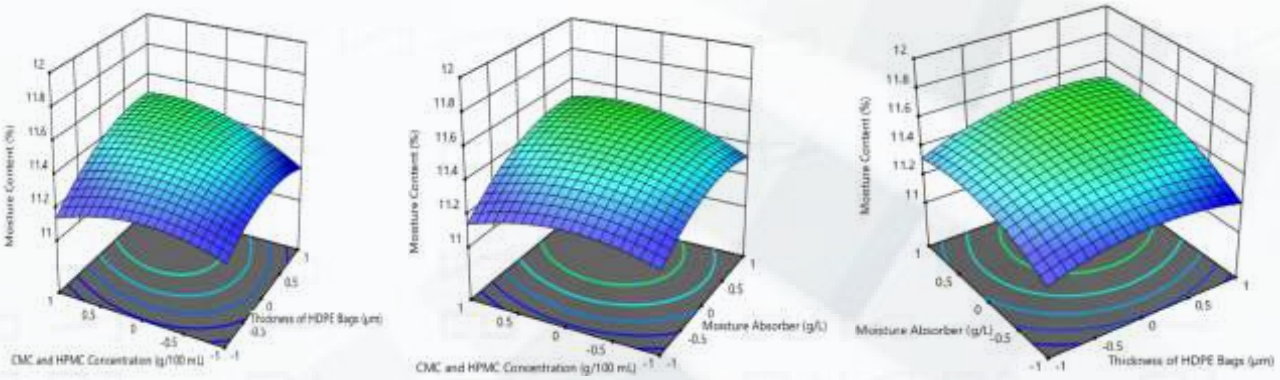
I.F. 4.8

The present investigation was focused on the optimization of process parameters for edible coating and the evaluation of quality characteristics of coated jaggery cubes stored for a period of 150 days. Quality parameters were evaluated at intervals of 0, 45, 90, 120, 135, and 150 days under ambient storage conditions. A total of 17 experiments as per BBD were carried out with three independent variables, including the HDPE bag thickness (100, 150, and 200 µm), the moisture absorber (1.5, 2.5, and 3.5 g/L), and the concentration ratio of CMC and HPMC (0.8, 1.2, and 1.6 g/100 mL). The responses, i.e., moisture content, pH, hardness, overall acceptability, and yeast/mould count for coated jaggery cubes, were evaluated. The optimization was performed using design expert software (ver. 13), and optimised values for process parameters were observed as 100 µm (HDPE bag thickness), 1.5 g/L (moisture absorber), and 0.8 g/100 mL (concentration of CMC and HPMC). From the storage study results, it was observed that after 150 days of storage, the yeast/mould count (98 cfu/g) in the control sample was highest compared to the control sample (15 cfu/g). The highest overall acceptability score was observed in the case of packed coated jaggery cubes (8.5), while the least (5.5) was observed for control after 150 days of storage. It was concluded that edible coatings consisting of moisture absorbers (dimethyl fumarate and silica gel) and concentration ratios of CMC and HPMC, along with HDPE bags, could maintain the quality characteristics of jaggery cubes and enhance the shelf life up to 150 days.



3D response surface showing effect of process parameters (a) CMC & HPMC (concentration) and moisture absorber (b) moisture absorber and HDPE bag thickness (c) concentration of CMC & HPMC and HDPE bag thickness on moisture content.

Microbial Biotechnology
Kuddus et al., (2024) 17(4):14467

Cold-active microbial enzymes and their biotechnological applications

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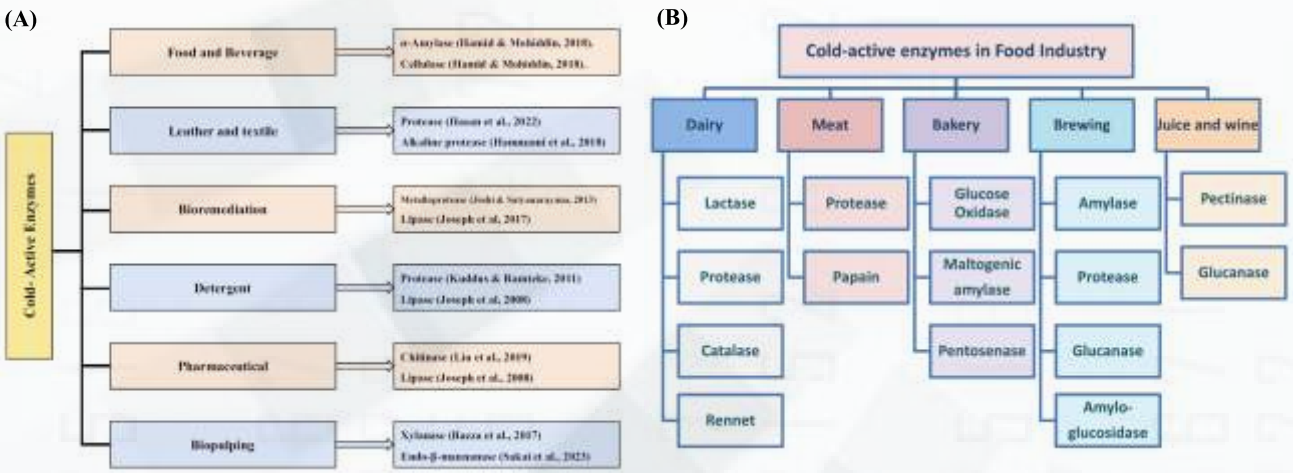
I.F. 4.8

Microorganisms known as psychrophiles/psychrotrophs, which survive in cold climates, constitute majority of the biosphere on Earth. Their capability to produce cold-active enzymes along with other distinguishing characteristics allows them to survive in the cold environments. Due to the relative ease of large-scale production compared to enzymes from plants and animals, commercial uses of microbial enzyme are alluring. The ocean depths, polar, and alpine regions, which make up over 85% of the planet, are inhabited to cold ecosystems. Microbes living in these regions are important for their metabolic contribution to the ecosphere as well as for their enzymes, which may have potential industrial applications. Cold-adapted microorganisms are a possible source of cold-active enzymes that have high catalytic efficacy at low and moderate temperatures at which homologous mesophilic enzymes are not active. Cold-active enzymes can be used in a variety of biotechnological processes, including food processing, additives in the detergent and food industries, textile industry, waste-water treatment, biopulping, environmental bioremediation in cold climates, biotransformation, and molecular biology applications with great potential for energy savings. Genetically manipulated strains that are suitable for producing a particular cold-active enzyme would be crucial in a variety of industrial and biotechnological applications. The potential advantage of cold-adapted enzymes will probably lead to a greater annual market than for thermo-stable enzymes in the near future. This review includes latest updates on various microbial source of cold-active enzymes and their biotechnological applications.



Biotechnological applications of microbial enzymes

Journal of Agriculture and Food Research
Singh et al., (2023) 14:100902

Classification, benefits, and applications of various anti-nutritional factors present in edible crops

Poornima Singh[a], Vinay Kumar Pandey[b], **Zainab Sultan[c]**, **Rahul Singh[c]**, Aamir Hussain Dar[d]

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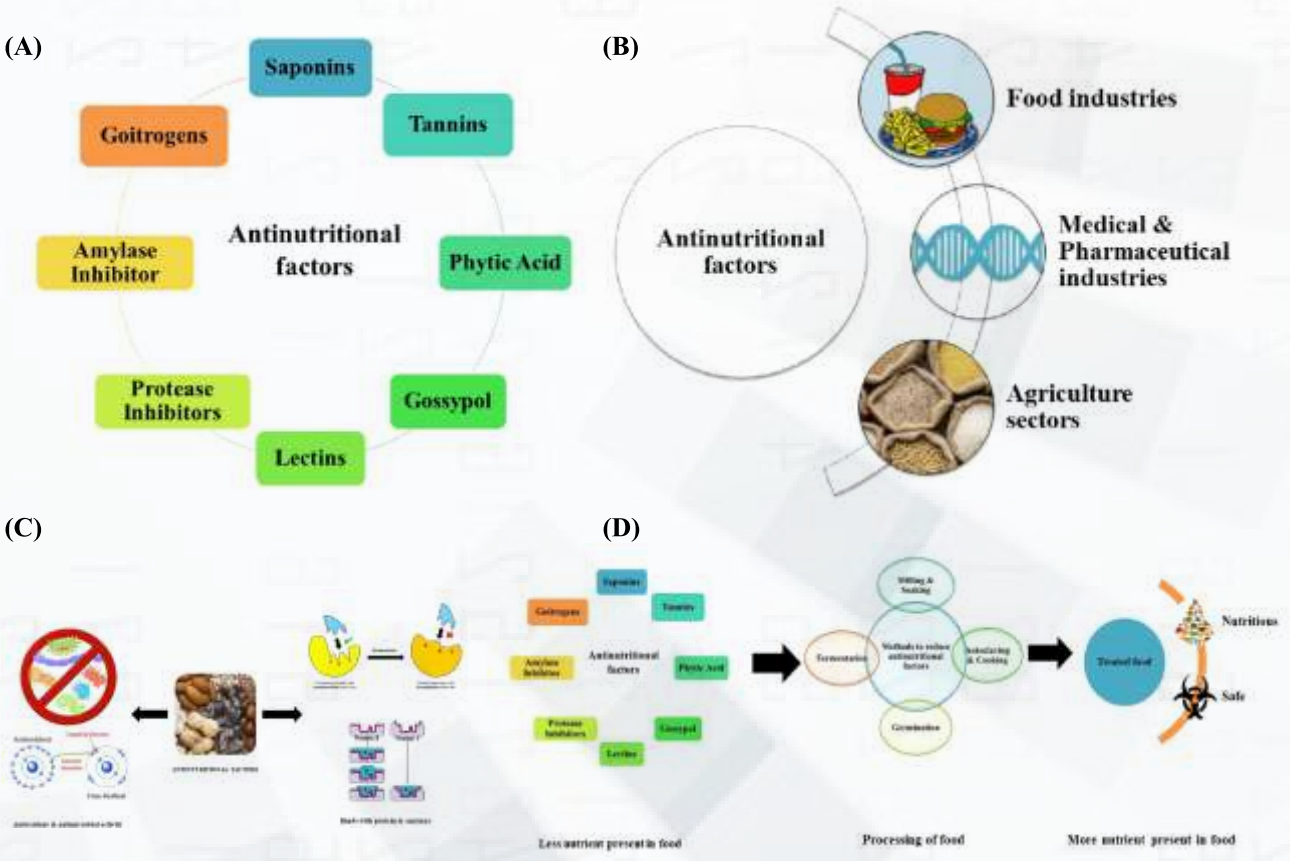
I.F. 4.8

Edible crops are composed of macronutrients, micronutrients, and anti-nutritional factors. Anti-nutritional factors can interact with nutrients, resulting in a reduction in the bioavailability of these nutrients. Several methods can be employed to decrease the presence of antinutrient elements, including processing processes like autoclaving, debranding, fermentation, soaking, and germination. The integration of various methodologies has the potential to reduce the presence of antinutrients in food items. Numerous botanical species possess bioactive chemicals that have medicinal properties and serve various additional purposes. Tannins are a class of anti-nutritional compounds that are present in a variety of fruits, vegetables, and tea. The substance possesses a distinctly acrid flavor and can be employed for food preservation, leather production, and as a natural coloring agent. Phytic acid possesses various applications within the realm of the food sector. Further investigation is required to comprehensively comprehend the intricate health implications of ANFs, as well as to devise innovative strategies for mitigating their adverse consequences while preserving their advantageous attributes. The research conducted by ANF exhibits considerable promise and is seeing notable growth, thereby aiding scientists in improving the nutritional value of food and discovering innovative therapeutic solutions.



Anti-nutritional factors in edible crops

Journal of Agriculture and Food Research
Pandey et al., (2023) 14:100791

Effects of clove essential oil (*Caryophyllus aromaticus* L.) nanoemulsion incorporated edible coating on shelf-life of fresh cut apple pieces

Vinay Kumar Pandey[a], Shivangi Srivastava[b], **Rahul Singh**[a], Aamir Hussain Dar[c], Kshirod K. Dash[d]

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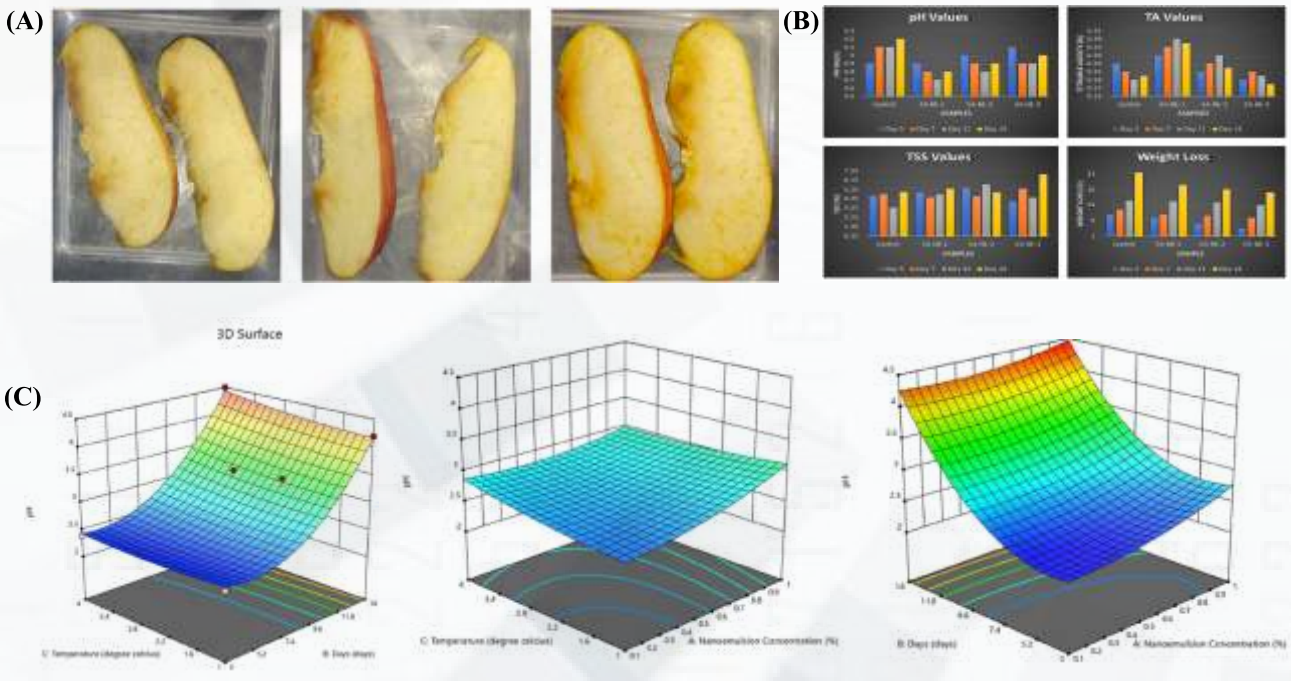
I.F. 4.8

Fresh cut fruit is ready to eat and can be taken on the go. Freshly cut apple pieces are perishable and prone to contamination that can damage its quality. In the current investigation, clove essential oil was used to formulate nanoemulsion (NE) in three distinct concentrations, NE-1 (0.1%), NE-2 (0.5%), and NE-3 (1%), which were then incorporated with Sodium Alginate (SA) based coating solution to impart their qualities to the outer surface of apple pieces. Sodium alginate layer helps to extend the shelf life of fruits by reducing moisture loss, inhibiting microbial growth, and protecting against physical damage. Physico-chemical properties of this solution were investigated using Box–Behnken design after it was employed to coat the freshly cut apple pieces and stored at 4 °C for 14 days. The clove essential oil nanoemulsion's average droplet size and Zeta Potential were in the nanometric range. The addition of increasing concentrations of clove nanoemulsion to the alginate coating solution decreased the zeta potential of the colloidal dispersion from −51.0 to −3.02 mV. The average droplet diameter of the edible coatings containing different clove nanoemulsion concentrations (81.04–3342 nm), whereas sodium alginate edible coating solution (SA) was in micrometric range. The Total phenol content and Antioxidant content of CEO based samples were found to be high as 38.9 mg/ml and 79.1% respectively because of bioactive chemicals and essential oil properties. NE-3 coated apple samples were found to more affective compared with the control and SA coated samples in terms of sensory and shelf-life metrics among all the treatments.



Edible coating to increase the shelf-life of fresh cut apple pieces

Biomolecules
Yaser et al., (2023) 13(12):1785

Biological Synthesis, Characterization, and Therapeutic Potential of S. commune-Mediated Gold Nanoparticles

Yaser E. Alqurashi [1,*], Sami G. Almalki [2], Ibrahim M. Ibrahim [3], Aisha O. Mohammed [1], Amal E. Abd El Hady [1], Mehnaz Kamal [4], **Faria Fatima** [5,*] and Danish Iqbal [6]
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3 Department of Pharmacology, Faculty of Medicine, King Abdulaziz University, Jeddah 21589, Saudi Arabia
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Al-Kharj 11942, Saudi Arabia
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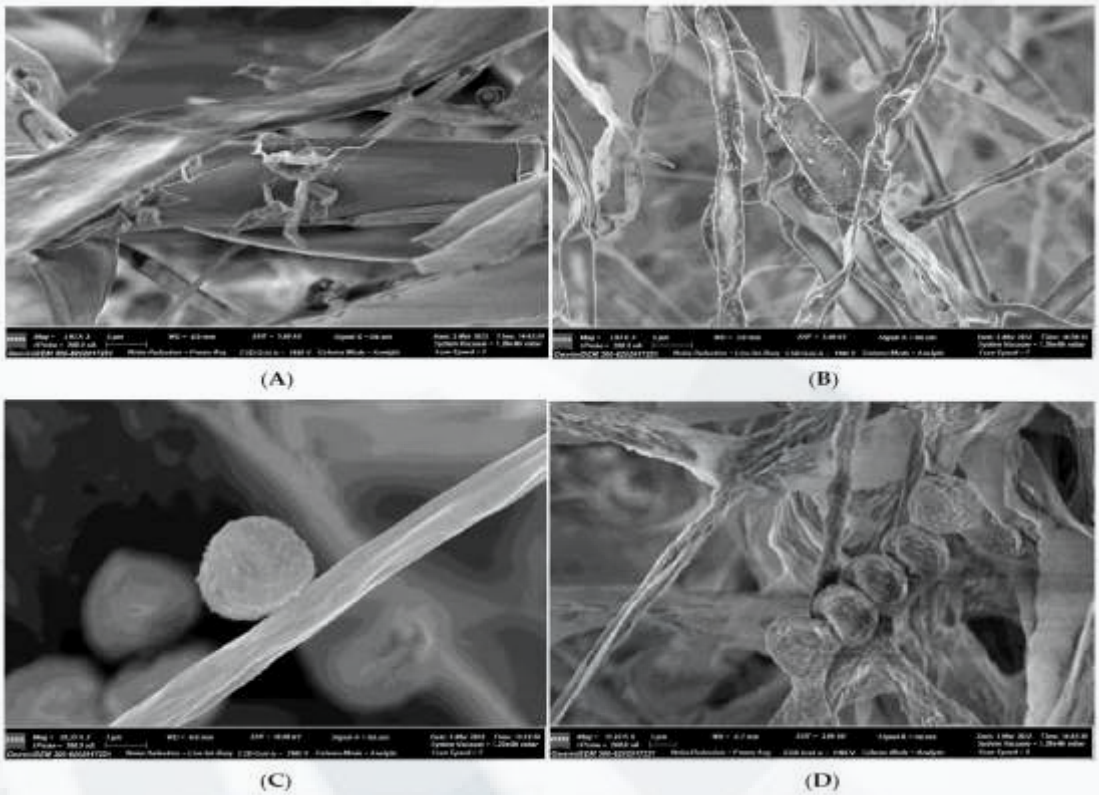
I.F. 4.8

Green-synthesized gold nanoparticles demonstrate several therapeutic benefits due to their safety, non-toxicity, accessibility, and ecological acceptance. In our study, gold nanoparticles (AuNPs) were created using an extracellular extract from the fungus Schizophyllum commune (S. commune). The reaction color was observed to be a reddish pink after a 24 h reaction, demonstrating the synthesis of the nanoparticles. The myco-produced nanoparticles were investigated using transmission electron microscopy (TEM), dynamic light scattering (DLS), and UV–visible spectroscopy. The TEM pictures depicted sphere-like shapes with sizes ranging from 60 and 120 nm, with an average diameter of 90 nm, which is in agreement with the DLS results. Furthermore, the efficiency of the AuNPs' antifungal and cytotoxic properties, as well as their production of intracellular ROS, was evaluated. Our findings showed that the AuNPs have strong antifungal effects against Trichoderma sp. and Aspergillus flavus at increasing doses. Additionally, the AuNPs established a dose-dependent activity against human alveolar basal epithelial cells with adenocarcinoma (A549), demonstrating the potency of synthesized AuNPs as a cytotoxic agent. After 4 h of incubation with AuNPs, a significant increase in intracellular ROS was observed in cancer cells. Therefore, these metallic AuNPs produced by fungus (S. commune) can be used as an effective antifungal, anticancer, and non-toxic immunomodulatory delivery agent.



Scanning electron micrographs of *A. flavus* with AuNPs

Journal of Drug Delivery Science and Technology
Mishra et al., (2023) 89:105014

Antiproliferative activity of gold and silver nanoparticles fabricated using bark extract of Murraya koenigii

Pooja Mishra[a], Tabrez Faruqui[a], Suma Akhtar[a], Iqra Nadeem[a], Imran Khan[b], Saikh Mohammad Wabaidur[c], Mohsin Kazi[d], Moniba Rahim[a], **Zeeshan Rafi**[e], **Salman Khan**[a]

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[b]*Department of Biochemistry and Molecular Biology, College of Medicine, University of Nebraska, Medical Center, 68198, USA*
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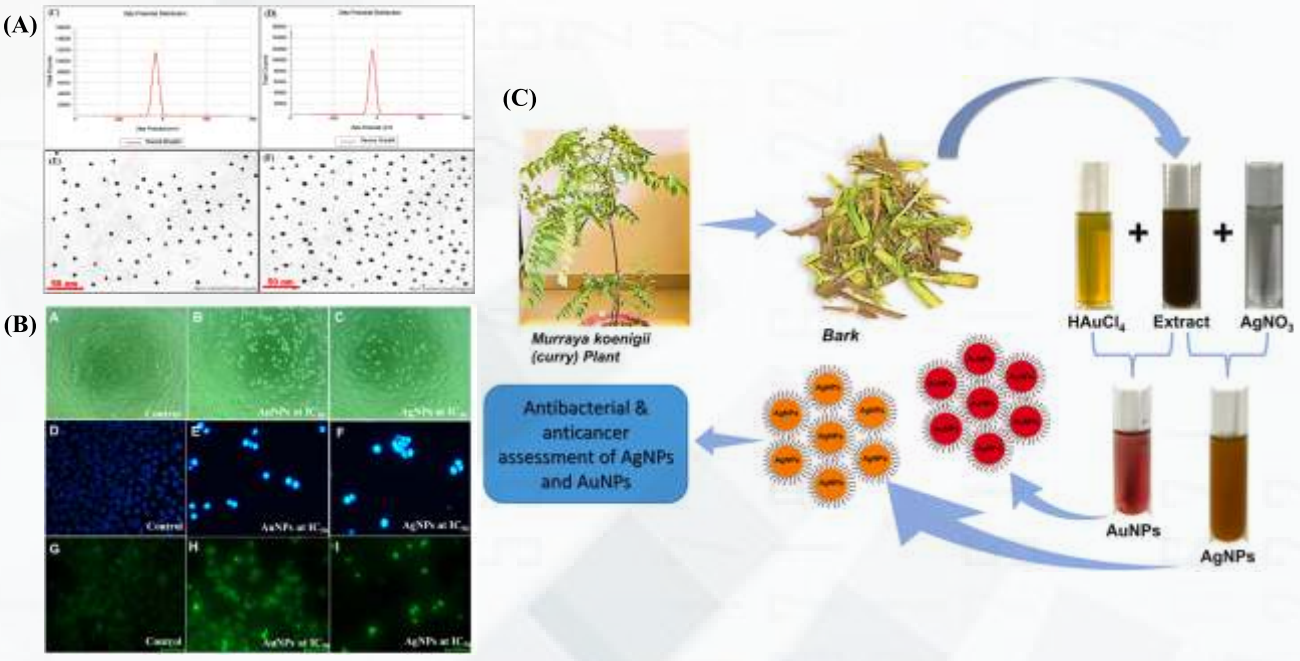
I.F. 4.5

Biologically synthesizing nanoparticles is an eco-friendly, new-fangled, and scaled-up technology. For instance, nanoparticle synthesis using organic resources, such as plants, is often safe. Owing to drug addiction and the development of antibiotic resistance in bacteria, disease prevalence and medical use have increased globally. Nano-formulation-based anti-microbial drugs are an alternative therapy for drug-resistant infections. This study reported the preparation of, gold (AuNPs) and silver nanoparticles (AgNPs) from the extract of *Murraya koenigii* (MK) bark, which was also used as an anti-bacterial and anti-cancer agent. Bio-synthesized nanoparticles were characterized via UV–visible spectroscopy, and Fourier Transform Infrared analysis which further validated the presence of biological components in the reaction mixture. Quasi-spherical forms of AuNPs and AgNPs were visible in the TEM images. For MK-AuNPs, the dimensions of the nanoparticles were 23 ± 2 nm and 25 ± 2 nm, respectively. Zeta potential calculations showed stable nanoparticles with a negative surface charge. In this study, we found that these nanoparticles have good anti-bacterial properties against Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella pneumonia, and Escherichia coli bacterial strains. Furthermore, MK-AuNPs and MK-AgNPs inhibited the growth of lung cancer (A549) cell lines. Thus, it can be said that these nanoparticles could be used as anti-bacterial agents against pathogenic bacteria and in treating human lung cancer.



Relationship between neck pain intensity, anthropometric metrics, cervical range of motion, and related disabilities using advanced machine learning techniques

Frontiers in Pharmacology
Jahan et al., (2024) 15:1343569

A protein–miRNA biomic analysis approach to explore neuroprotective potential of nobiletin in human neural progenitor cells (hNPCs)

Sadaf Jahan1,2*†, Uzair Ahmad Ansari3,4†, Ankur Kumar Srivastava3†, Sahar Aldosari1,2, Nessrin Ghazi Alabdallat1,2, Arif Jamal Siddiqui5, **Andleeb Khan6**, Hind Muteb Albadrani7, Sana Sarkar3, Bushra Khan3, Mohd Adnan5 and Aditya Bhushan Pant3,4

1Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Majmaah University, Majmaah, 11952, Saudi Arabia, 2Health and Basic Sciences Research Center, Majmaah University, 11952 Majmaah, Saudi Arabia,
3Developmental Toxicology Laboratory, Systems Toxicology Group, CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Vishvigyan Bhavan, 31, Mahatma Gandhi Marg, P.O. Box No. 80, Lucknow 226001, Uttar Pradesh, India,
4Academy of Scientific and Innovative Research (AcSIR), Ghaziabad 201002, India, 5Department of Biology, College of Science, University of Hail, Hail, Saudi Arabia,
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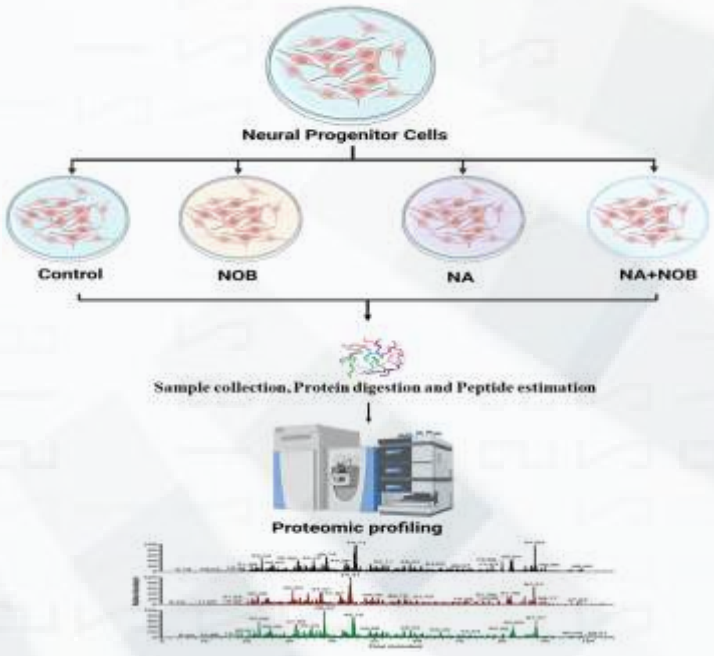
I.F. 4.4

Chemical-induced neurotoxicity is increasingly recognized to accelerate the development of neurodegenerative disorders (NDs), which pose an increasing health burden to society. Attempts are being made to develop drugs that can cross the blood–brain barrier and have minimal or no side effects. Nobiletin(NOB), a polymethoxylated flavonoid with anti-oxidative and antiinflammatory effects, has been demonstrated to be a promising compound to treat a variety of NDs. Here, we investigated the potential role of NOB in sodium arsenate (NA)-induced deregulated miRNAs and target proteins in human neural progenitor cells (hNPCs). The proteomics and microRNA (miRNA) profiling was done for different groups, namely, unexposed control, NA-exposed, NA + NOB, and NOB groups. Following the correlation analysis between deregulated miRNAs and target proteins, RTPCR analysis was used to validate the selected genes. The proteomic analysis showed that significantly deregulated proteins were associated with neurodegeneration pathways, response to oxidative stress, RNA processing, DNA repair, and apoptotic process following exposure to NA. The OpenArray analysis confirmed that NA exposure significantly alteredmiRNAs that regulate P53 signaling, Wnt signaling, cell death, and cell cycle pathways. The RT-PCR validation studies concur with proteomic data as marker genes associated with autophagy and apoptosis (HO-1, SQSTM1, LC-3, Cas3, Apaf1, HSP70, and\SNCA1) were altered following NA exposure. It was observed that the treatment of NOB significantly restored the deregulated miRNAs and proteins to their basal levels. Hence, it may be considered one of its neuroprotective mechanisms. Together, the findings are promising to demonstrate the potential applicability of NOB as a neuroprotectant against chemical-induced neurotoxicity.



Schematic diagram of a proteomic experimental condition. Samples derived from all the four groups were digested with Trypsin/Lys-C mix of mass spec-grade for label-free quantification.

Saudi Journal of Biological Sciences
Alyahyawi et al., (2023) 30(10):103782

Exploring Kinnow mandarin's hidden potential: Nature's key to antimicrobial and antidiabetic gold nanoparticles (K-AuNPs)

Amjad R. Alyahyawi [a,b,1], Salman Khan [c,1], Zeeshan Rafi [d], Parul Singh [c], Kahkashan Moheet [d], Rihab Akasha [c], Saheem Ahmad [c]

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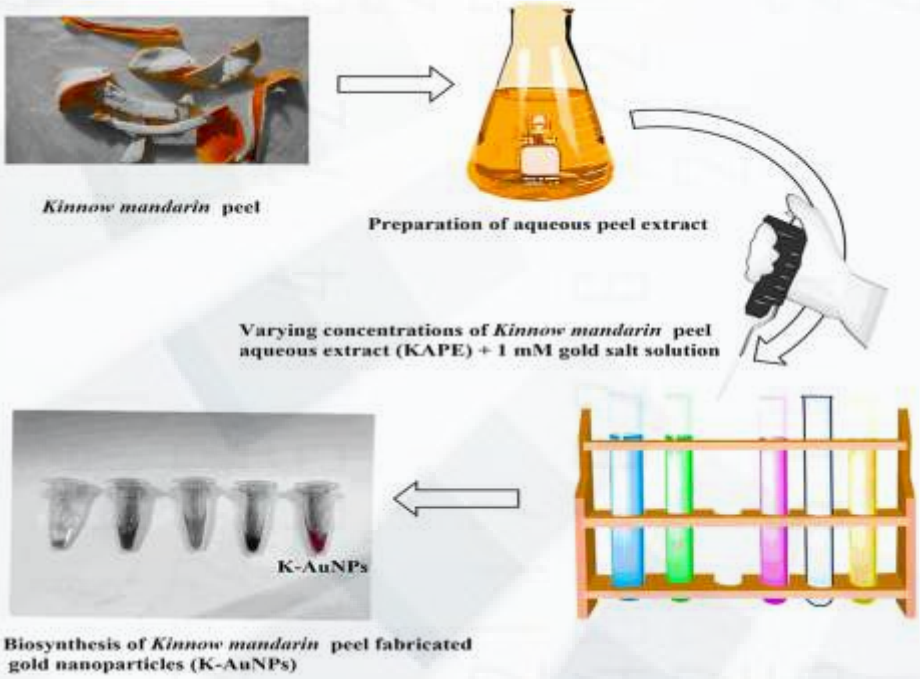
I.F. 4.4

This pioneering study aims to address the paradox of the highly regarded Kinnow mandarin fruit, whose valuable peels have been considered undesired remnants from industrial fruit juice production. The study proposes the utilization of these discarded peels to synthesize ecologically safe gold nanoparticles (KAuNPs) through a one-pot method. The objectives of this research are to synthesize K-AuNPs using an ecologically safe single-step approach, utilizing discarded Kinnow mandarin fruit peels, and to assess their antibacterial and antidiabetic potential. The validation of K-AuNPs involved various techniques including UV–visible spectroscopy, TEM, DLS, and zeta-potential investigations. The antibacterial activity against Escherichia coli, Pseudomonas aeruginosa, and Bacillus subtilis was compared to levofloxacin and Kinnow mandarin aqueous peel extract (KAPE). Furthermore, the anti-diabetic efficacy was evaluated through a-amylase and a-glucosidase experiments, comparing K-AuNPs to pure KAPE and the standard inhibitor acarbose. The results confirmed the successful synthesis of K-AuNPs from KAPE, as evidenced by UV-spectral profiles (527 nm), TEM micrographs (21 d. nm), dynamic light scattering (65 d.nm), and zeta-potential (-12 mV). The K-AuNPs demonstrated a superior zone of inhibition and lower MIC values against Escherichia coli, Pseudomonas aeruginosa, and Bacillus subtilis, surpassing levofloxacin and KAPE alone. Additionally, the K-AuNPs exhibited potent anti-diabetic efficacy, outperforming both pure KAPE and acarbose at a lower dosage. To sum up, the process of producing K-AuNPs utilizing Kinnow mandarin peel extracts demonstrates a powerful antibacterial and antidiabetic remedy sourced from previously discarded materials. These findings signify a significant leap forward in the domain of natural product exploration, with the potential to fundamentally reshape modern healthcare approaches.



Ruby red colour of the K-AuNPs obtained after the significant reduction of HAuCl4 into gold nanoparticles (K-AuNPs).

Probiotics and Antimicrobial Proteins
Siddiqui et al., (2023) 12:1-8

Silver Nanoparticles Derived from Probiotic Lactobacillus casei—a Novel Approach for Combating Bacterial Infections and Cancer

Arif Jamal Siddiqui[1] · Mitesh Pate[l2] · Sadaf Jahan[3] · Abdelmushin Abdelgadir[1] · Mohammad Jahoor Alam[1] · Mohammed Merae Alshahrani[4] · Wael Alturaiki[3] · Manojkumar Sachidanandan[5] · **Andleeb Khan[6,7]** · Riadh Badraoui[1,8] · Mohd Adnan[1]

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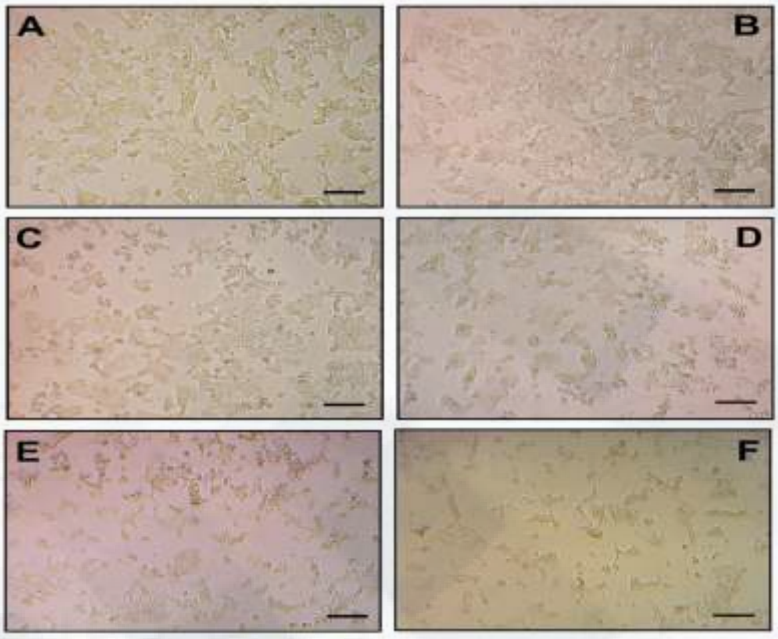
University of Tunis El Manar, 1017 La Rabta, Tunis, Tunisia
Content courtesy

I.F. 4.4

In the face of rising antibiotic resistance and the need for novel therapeutic approaches against cancer, the present study delves into the various facets of biosynthesized silver nanoparticles (AgNPs) derived from the probiotic strain Lactobacillus casei (AgNPs-LC), assessing their efficacy in combating bacterial infections, disrupting biofilm formation, interfering with quorum sensing mechanisms, and exhibiting anti-cancer properties. The results showed that the AgNPs-LC had a spherical shape with an average size of 15 nm. The biosynthesized AgNPs-LC showed a symmetrical absorption spectrum with a peak at 458 nm with a diameter of 5–20 nm. AgNPs-LC exhibited significant antibacterial activity against Gram-positive and Gram-negative bacteria and inhibited the biofilm formation (> 50% at sub-MIC) and quorum sensing-mediated virulence factors, such as the production of violacein in C. violaceum (> 80% at sub-MIC), pyocyanin in P. aeruginosa (> 70% at sub- MIC), and prodigiosin in S. marcescens (> 80% at sub-MIC). The exopolysaccharides (EPS) were also found to reduce in the presence of AgNPs-LC. Furthermore, the AgNPs-LC showed anti-cancer and anti-metastasis activity via inhibiting cell migration and invasion of human lung cancer (A-549) cells. Overall, the present study brings out the multifaceted therapeutic capabilities of AgNPs-LC which offer exciting prospects for the development of innovative biomedical and pharmaceutical interventions, making AgNPs-LC a versatile and promising candidate for a wide range of applications in healthcare and medicine. However, further research is essential to fully harness their therapeutic potential.



The morphology of A549 cells treated with different concentrations of AgNPs-LC was observed under an inverted microscope.

Frontiers in Pharmacology
Mishra et al., (2023) 14:1194578

Methotrexate-conjugated zinc oxide nanoparticles exert a substantially improved cytotoxic effect on lung cancer cells by inducing apoptosis

Prakriti Mishra1, Mohd Faizan Ali Ahmad1, Lamya Ahmed Al-Keridis2*, Mohd Saeed3, Nawaf Alshammari3, Nadiyah M. Alabdallah4,5, Rohit Kumar Tiwari1,6, **Afza Ahmad1, Mahima Verma1, Shireen Fatima1 and Irfan Ahmad Ansari1***
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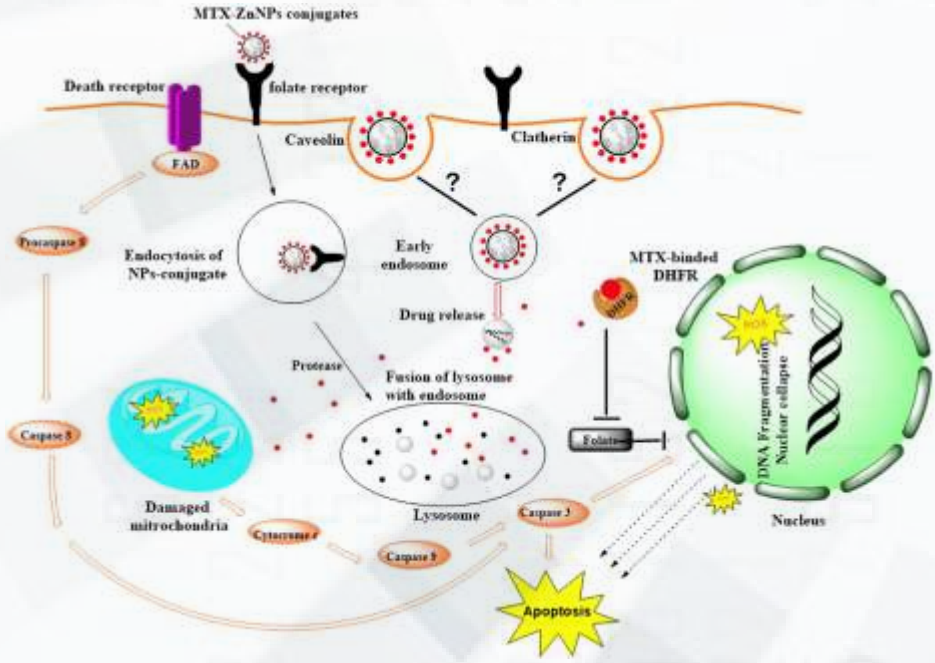
I.F. 4.4

In the current study, we report the synthesis of methotrexate-conjugated zinc oxide nanoparticles (MTX-ZnONPs) and their high efficacy against lung cancer cells. Conjugation of MTX with ZnONPs was authenticated by UV-vis spectroscopy, dynamic light scattering (DLS), Fourier-transform infrared (FTIR) spectroscopy, and transmission electron microscopy (TEM). This drugnanoconjugate also showed high drug-loading efficiency. The therapeutic efficacy of MTX-ZnONPs was further tested in vitro against A549 cells, and the results of MTT and LDH release assays showed that MTX-ZnONPs, in addition to free MTX, were efficient in exerting cytotoxic effect on A549 cells; however, the effectiveness of MTX-ZnONPs was found to be considerably enhanced at very low doses compared to that of free MTX. Moreover, ZnONPs alone significantly inhibited the cell viability of A549 cells at a much higher concentration compared to MTX-ZnONPs and MTX. Furthermore, the cytomorphology of A549 cells was characterized by cellular shrinkage and detachment from the surface in all the treatment groups. Similarly, A549 cells, in all the treatment groups, showed fragmented and condensed nuclei, indicating the initiation of apoptosis. Mitochondrial membrane potential (ψm) in A549 cells showed a gradual loss in all the treatment groups. Results of the qualitative and quantitative analyses depicted increased reactive oxygen species (ROS) levels in A549 cells. The results of the caspase activity assay showed that MTX-ZnONPs andfree MTX caused significant activation of caspase-9, -8, and -3 in A549 cells; however, the effect of MTX-ZnONPs was more profound at very low doses compared to that of free MTX. Thus, our results showed high efficacy of MTX-ZnONPs, suggesting efficient intracellular delivery of the drug by ZnONPs as nanocarriers.



Possible mode of internalization of MTX-ZnONPs via caveolin-mediated or clathrin-mediated endocytosis and mechanism of action of MTX in A549 cells.

European Journal of Pharmaceutics and Biopharmaceutics
Baker et al., (2023) 192:88-111

Survivin-targeted nanomedicine for increased potency of abiraterone and enzalutamide against prostate cancer

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b Department of Botany and Microbiology, College of Science, King Saud University, P.O. 2455, Riyadh 11451, Saudi Arabia
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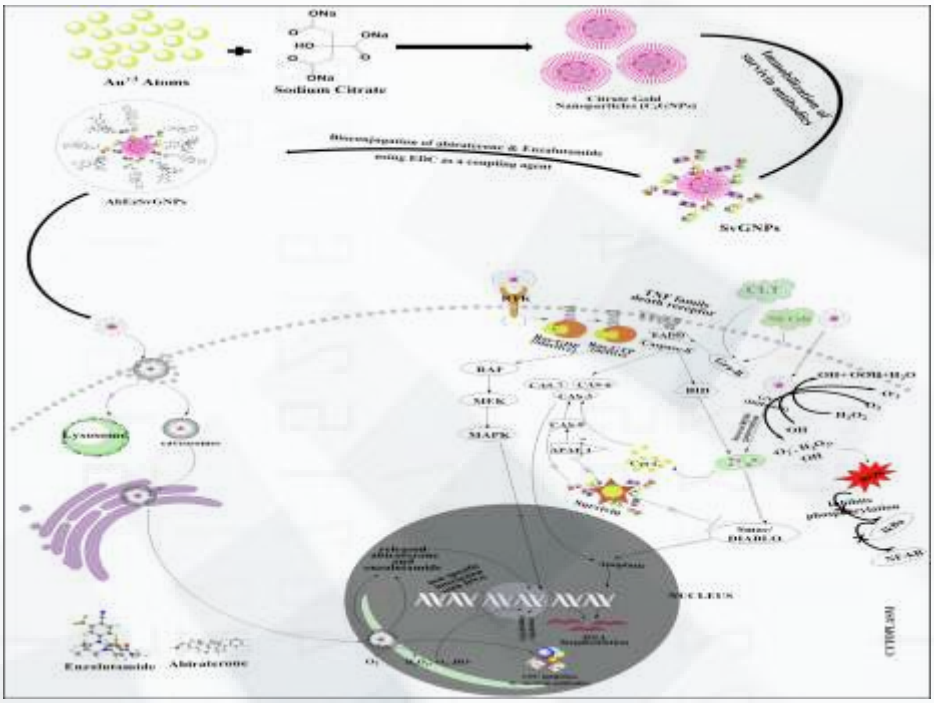
I.F. 4.4

Prostate cancer is the leading and most aggressive cancer around the world, several therapeutic approaches have emerged but none have achieved the satisfactory result. However, these therapeutic approaches face many challenges related to their delivery to target cells, including their in vivo decay, the limited uptake by target cells, the requirements for nuclear penetration (in some cases), and the damage caused to healthy cells. These barriers can be avoided by effective, targeted, combinatorial approaches, with minimal side effects, which are being investigated for the treatment of cancer. Here, we developed a combinatorial nanomedicine comprising abiraterone and enzalutamide bioconjugated survivin-encapsulated gold nanoparticles (AbEzSvGNPs) for targeted therapy of prostate cancer. AbEzSvGNPs were characterized by different biophysical techniques such as UV visible spectroscopy, dynamic light scattering, zeta potential, transmission electron microscope, and Fourier transform infrared spectroscopy. Interestingly, the effect of abiraterone, enzalutamide and surviving encapsulated gold nanoparticles was found to be synergistic in nature in AbEzSvGNPs against DU 145 (IC50 = 4.21 μM) and PC-3 (IC50 = 5.58 μM) cells and their potential was observed to be greatly enhanced as compared with the combined effect of the drugs (abiraterone and enzalutamide) in their free form. Furthermore, AbEzSvGNPs were found to be highly safe and did not exhibit significant cytotoxicity against normal rat kidney cells. The observed effects of AbEzSvGNPs involved the modulation of different signaling pathways in prostate cancer cells. This delivery system employed non-androgen receptor-dependent delivery of abiraterone and enzalutamide. The anionic AbEzSvGNPs delivered abiraterone and enzalutamide unaltered into the nucleus through caveolae mediated internalization to act nonspecifically on DNA; internalization of the anionic nanoparticles into the cytoplasm was also observed via other routes. AbEzSvGNPs synthesized and evaluated in this study are promising candidates for prostate cancer therapy.



Schematic representation of the synthesis of SvGNPs and their bioconjugation with Ez and Ab.

European Journal of Pharmaceutical Sciences
Fernandes et al., (2023) 19:106586

Shrinking the battlefield in cancer therapy: Nanotechnology against cancer stem cells

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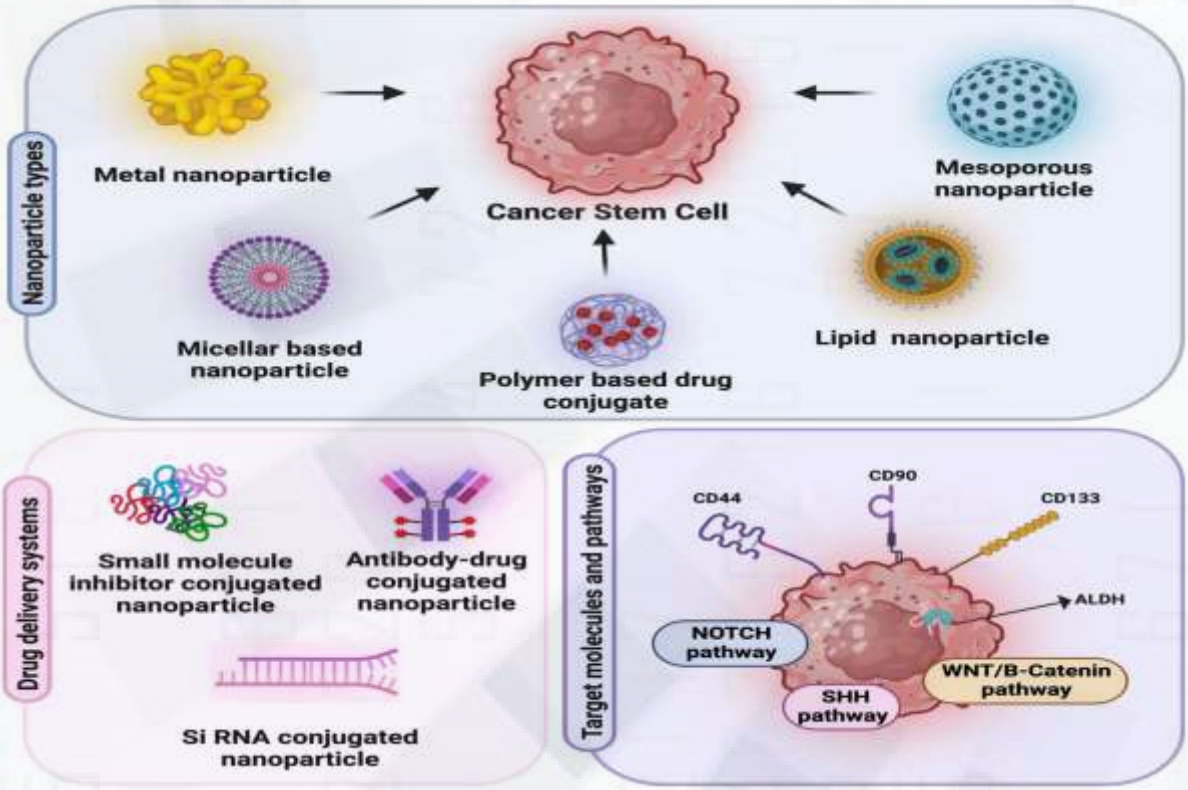
h ***Department of Biosciences, Integral University, Lucknow, Uttar Pradesh 22602, India***

I.F. 4.3

Cancer remains one of the leading causes of mortality worldwide, presenting a significant healthcare challenge owing to the limited efficacy of current treatments. The application of nanotechnology in cancer treatment leverages the unique optical, magnetic, and electrical attributes of nanomaterials to engineer innovative, targeted therapies. Specifically, manipulating nanomaterials allows for enhanced drug loading efficiency, improved bioavailability, and targeted delivery systems, reducing the non-specific cytotoxic effects characteristic of conventional chemotherapies. Furthermore, recent advances in nanotechnology have demonstrated encouraging results in specifically targeting CSCs, a key development considering the role of these cells in disease recurrence and resistance to treatment. Despite these breakthroughs, the clinical approval rates of nano-drugs have not kept pace with research advances, pointing to existing obstacles that must be addressed. In conclusion, nanotechnology presents a novel, powerful tool in the fight against cancer, particularly in targeting the elusive and treatment-resistant CSCs. This comprehensive review delves into the intricacies of nanotherapy, explicitly targeting cancer stem cells, their markers, and associated signaling pathways.



Types and applications of nanomedicine in targeting cancer stem cells

Materials Chemistry and Physics
Iqbal et al., (2023) 298:127397

Proficient visible-light-driven photocatalytic and anti-biofilm activity of biosynthesized CeO_2-graphene oxide nanocomposites

Arshad Iqbal[a,b], Tanveer Ahamad[b], Faizan Abul Qais[c], Nafees Ahmad[d], Adil Shafi[e], Arham Shareef Ahmed[b], Seema Srivastava[a]

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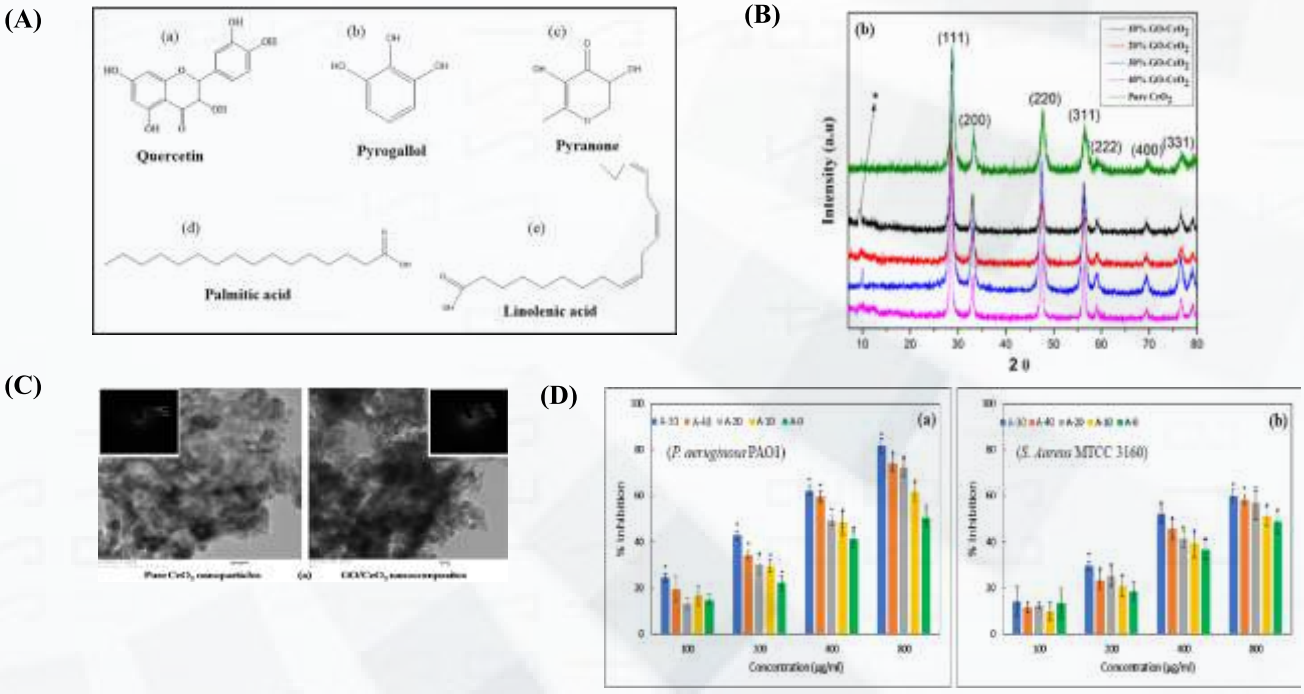
I.F. 4.3

This study has applied a simple sonication method to synthesize graphene oxide (GO) loaded cerium oxide (CeO_2) nanocomposites from an aqueous extract of *Phoenix dactylifera* fruit. The green route was employed because it is eco-friendly and cost-effective. The synthesized nanocomposites were analyzed by various characterization tools such as XRD, UV–Vis. spectroscopy, TEM, FTIR, RAMAN, GC-MS, BET, and XPS to study their structural, morphological, and optical properties. The obtained nanoparticles were spherical, with average crystallite sizes between 6 and 12 nm. Owing to the presence of toxic agents and a high load of microbial agents in wastewater, the development of sustainable and environment-friendly technology for wastewater treatment is gaining importance. In this regard, the photodegradation efficiency of the biosynthesized GO/CeO_2 nanocomposites was studied by the degradation of model dye, methyl orange (100 ppm), and the anti-biofilm activity of the nanocomposites was investigated against Gram-positive and Gram-negative bacteria under visible light irradiation. The GO/CeO_2 nanocomposite samples have shown enhanced removal of methyl orange dye compared to bare CeO_2 nanoparticles. The experimental observation showed that the 30% GO-CeO_2 is the optimized nanocomposite that achieved 93% photocatalytic degradation efficiency and maximum incubation, 82% of gram-negative and 60% of gram-positive, of bacteria. Thus, GO/CeO_2 nanocomposites, owing to their enhanced photocatalytic proficiency and anti-biofilm activity, could be utilized for wastewater treatment.



Photocatalytic and anti-biofilm activity of biosynthesized CeO_2-graphene oxide nanocomposites

Materials Chemistry and Physics
Iqbal et al., (2023) 298:127397

Design and Simulation of SPR Sensors by Employing Silicon & Silicon-Nitride with Mono and Bimetal layers for Sensitivity Enhancement

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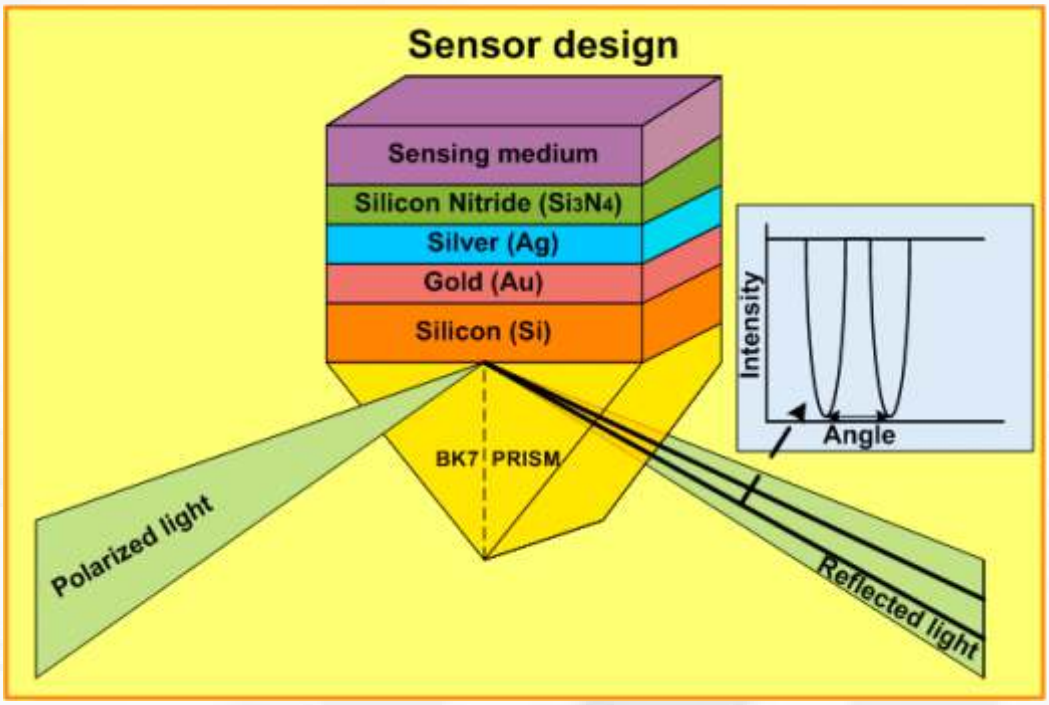
Arica, Chile.

I.F. 4.3

In this work, three novel Surface Plasmon Resonance (SPR) sensors based on the Kretschmann configuration are proposed. The optimized structural designs of Sensor-1 [BK7/Si(42nm)/ Au(25nm)/Ag(25nm) /Si3N4 (18nm)/Sensing medium] and Sensor-2 [BK7/Si(10nm)/ Au(30nm)/ Ag(30nm)/Si3N4(20nm)/Sensing medium] incorporate bimetallic layers of Gold (Au) and Silver (Ag), while Sensor-3 [BK7/Si(32nm)/Ag(25nm)/Si3N4(20nm)/Sensing medium] includes only an Ag layer. These biosensors feature Silicon (Si) and Silicon Nitride (Si3N4) as dielectric layers. The study employs the transfer matrix method to optimize the sensors and evaluates their performance using the angle modulation method. Results indicate that reverse optimization, optimizing the Si3N4 layer before the Si layer, yields significantly better performance than conventional optimization. Sensor-2 outperforms Sensor-1 and Sensor-3, demonstrating superior sensitivity, detection accuracy, and figure of merit. The maximum sensitivity (S), Detection accuracy (DA), and figure of merit (FoM) for Sensor-1 are calculated as 440Åã/ RIU, 0.1470 1/degree, and 64.70 1/RIU, respectively. Sensor-2 and Sensor-3 achieve even higher performance when analyzed using reverse optimization, with their sensitivity (S), Detection accuracy (DA), and figure of merit (FoM) values at 460Åã/RIU, 0.2222 1/degree, 102.222 1/RIU, and 460Åã/RIU, 0.2197 1/degree, 101.09 1/RIU, respectively. These novel SPR sensors demonstrate exceptional performance, as substantiated by a thorough comparison with recently published works in the field of biomedical applications. This comparison underscores the sensors' considerable potential in biosensing and biomedicine.



Pharmaceuticals
Prabhu et al., (2024) 17(5):578

Anticancer Potential and Molecular Targets of Pristimerin in Human Malignancies

Kirti S. Prabhu [1,*,†], Serah Jessy [1,†], Shilpa Kuttikrishnan [1,†], **Farina Mujeeb** [2], Zahwa Mariyam [1], Ummu Habeeba [1], Nuha Ahmad [1], Ajaz A. Bhat [3] and **Shahab Uddin** [1,2,4,5,*]

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2 Department of Biosciences, Integral University, Lucknow 226026, Uttar Pradesh, India
3 Department of Human Genetics-Precision Medicine in Diabetes, Obesity, and Cancer Program, Sidra Medicine, Doha 26999, Qatar;
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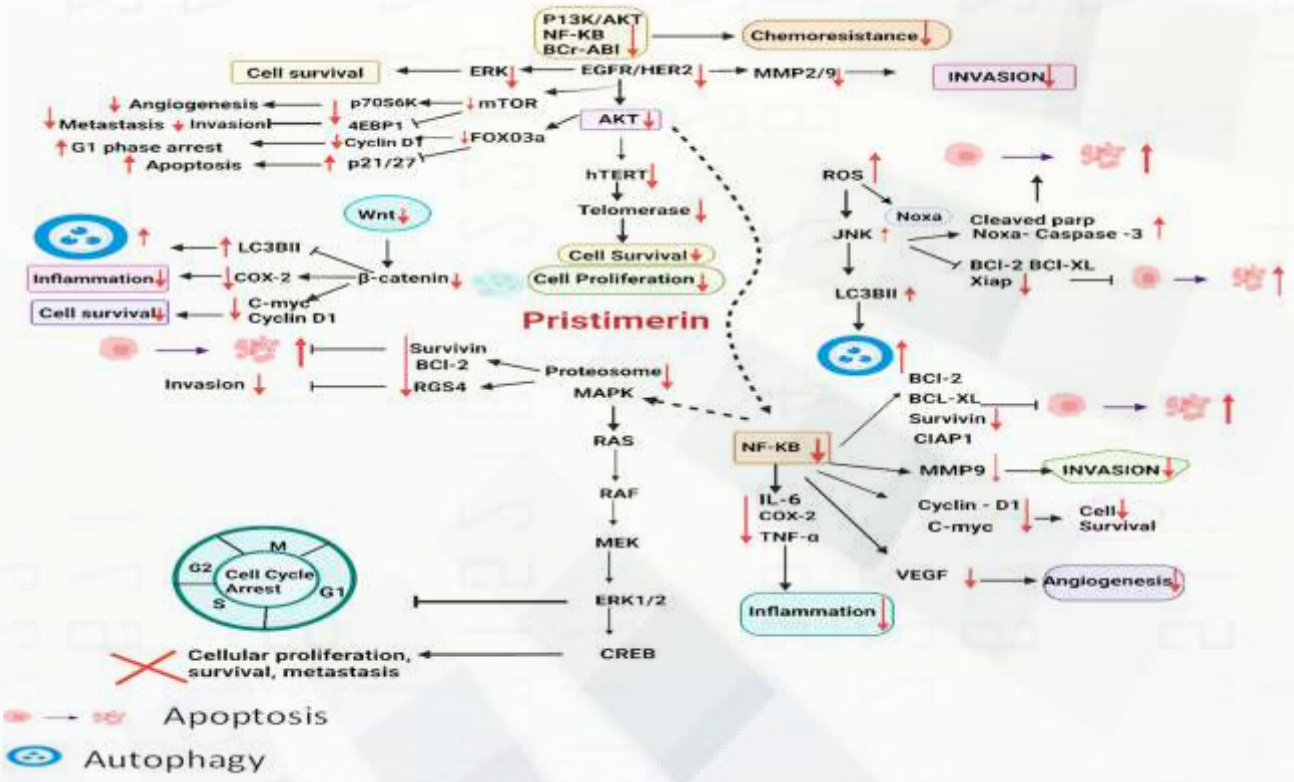
5 Laboratory of Animal Research Center, Qatar University, Doha 2713, Qatar

I.F. 4.3

The growing global burden of malignant tumors with increasing incidence and mortality rates underscores the urgent need for more effective and less toxic therapeutic options. Herbal compounds are being increasingly studied for their potential to meet these needs due to their reduced side effects and significant efficacy. Pristimerin (PS), a triterpenoid from the quinone formamide class derived from the Celastraceae and Hippocrateaceae families, has emerged as a potent anticancer agent. It exhibits broad-spectrum anti-tumor activity across various cancers such as breast, pancreatic, prostate, glioblastoma, colorectal, cervical, and lung cancers. PS modulates several key cellular processes, including apoptosis, autophagy, cell migration and invasion, angiogenesis, and resistance to chemotherapy, targeting crucial signaling pathways such as those involving NF-κB, p53, and STAT3, among others. The main objective of this review is to provide a comprehensive synthesis of the current literature on PS, emphasizing its mechanisms of action and molecular targets with the utmost clarity. It discusses the comparative advantages of PS over current cancer therapies and explores the implications for future research and clinical applications. By delineating the specific pathways and targets affected by PS, this review seeks to offer valuable insights and directions for future research in this field. The information gathered in this review could pave the way for the uccessful development of PS into a clinically applicable anticancer therapy.



Schematic presentation of PS's anticancer mechanisms of action targeting various signaling cascades via upregulation and downregulation of different regulatory proteins

Renewable Energy Focus
Pandey et al., (2023) 47:100508

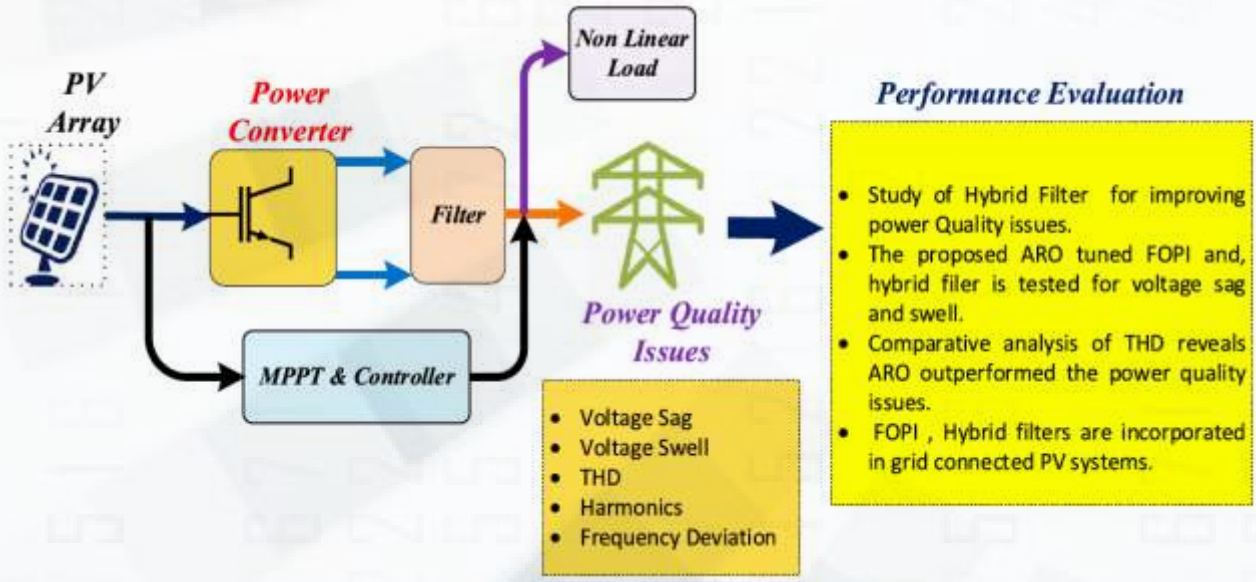
Power quality improvement using rabbit optimization FOPID controlled photovoltaic- battery powered hybrid power filter

Nirmal Kumar Pandey a,c, Rupendra Kumar Pachauri a,*, Sushabhan Choudhary a, **Ahmad Faiz Minai b,***

a Electrical Cluster, School of Advanced Engineering, University of Petroleum and Energy Studies, Dehradun- 248007, India
b Electrical Engineering Department, Integral University, Lucknow 226026, India *c Chhatrapati Shivaji Institute of Technology, Durg- 491001, India*

I.F. 4.2

This paper presents the tuning of a fractional proportional controller (FOPI) using artificial rabbit optimization for the control of photovoltaic (PV) and battery power series active power filters along with a shunt passive filter which is known as a hybrid power filter. The PV power generation is combined into a series active filter to alleviate the problem of voltage sag and swell in the power system and also supply real power to the grid. Generally, the proportional controller is used to control the series active filter, but this is a linear controller and is not able to control the non-linear power system effectively. This problem is effectively controlled by non-linear control, i.e., a fractional-order proportional integral controller. Another problem in FOPI is finding the optimal value for proportional gain, integral gain, and fractional order. There are no standard rules for finding these values. This will make system design more complex. In this paper, artificial rabbit optimization is used to simplify the system design by finding optimal values of the FOPI controller for the series active filter and enhance the overall performance of the system. The MATLAB 2020b/Simulink environment is utilized to assess the recommended controller's performance. According to the experimental findings, the suggested system has a total harmonic distortion (THD) value for load voltage of 0.10 % and a total harmonic distortion value for grid current of 1.87 %. The proposed artificial-rabbit optimized FOIPI controller effectively controls the system against voltage sag, swell, and non-linear loads and also obeys IEEE power quality standards.



Grid Connected system and Power quality issues

Renewable Energy Focus
Hussain et al., (2023) 47:100503

Performance analysis of the global maximum power point tracking based on spider monkey optimization for PV system

Mohammed Aslam Husain a,*, Suresh B. Pingale b, Aboo Bakar Khan b, **Ahmad Faiz Minai c**, Yudhishthir Pandey a, Radhe Shyam Dwivedi d

a EED, Rajkiya Engineering College, Ambedkar Nagar, India
b EEED, Faculty of Engg. & Tech., CSMU, Panvel, Navi Mumbai, India
c EED, Integral University, Lucknow, India
d Rajkiya Engineering College, Azamgarh, India

I.F. 4.2

In recent years, numerous in-depth studies have been conducted in the field of maximum power point tracking, and numerous innovative methodologies have also been suggested. According to the ongoing research in this field, the technique that would combine the advantages of all existing procedures would have the highest efficiency. In this paper, the study begins with an extensive description of the various MPPT approaches that are required for SPV systems. The benefits and drawbacks of these technique has been discussed. A global maximum power point tracking (GMPPT) technique that amalgamates the advantages of existing techniques has been presented. The proposed system utilizes the swarm intelligence-driven technique known as Spider Monkey Optimization (SMO). The details of how the novel SMO-GMPPT operates with SPV system is also discussed. Its working and the outcomes of the descriptive Simulink model has been presented. The simulation results have also been validated with the hardware results. The results show that SMO-GMPPT, has reduced steady state error (%), transient state error (%), and settling time as 0.061, 1.229 and 3ms respectively. Also dynamic state error in various conditions is reduced. The findings demonstrate the ability of SMO-GMPPT and results in a quick and reliable approach for GMPPT, to monitor the genuine global peak under partial shading events.

Hardware setup used for SMO-GMPPT validation

Renewable Energy Focus
Mohammad et al., (2023) 49:100579

Detailed modelling and performance analysis of power flow topology in a hybrid electric vehicle having series-parallel architecture

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[b]***Department of Electrical Engineering, Integral University, Lucknow, India***
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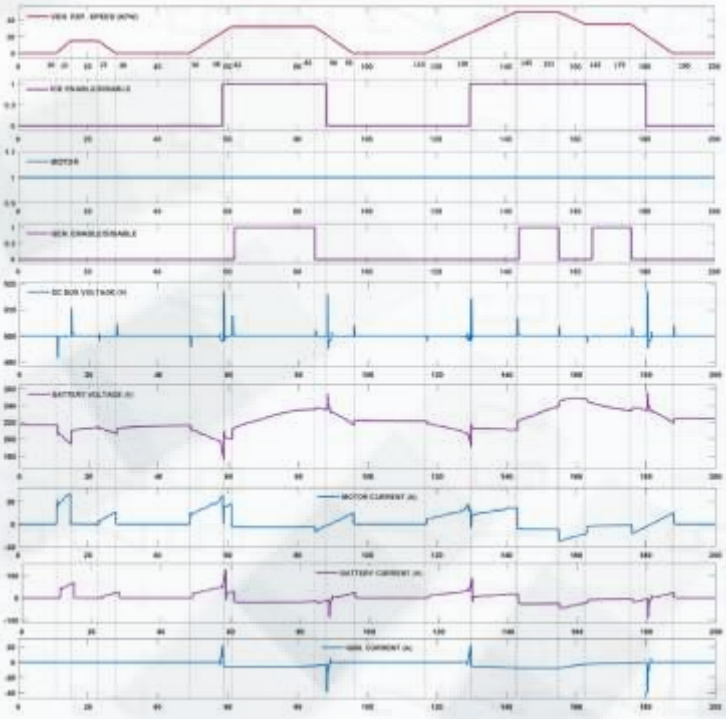
I.F. 4.2

Despite massive investment and carbon-neutral transition goals set around the world, gasoline-based internal combustion engine vehicles still form an absolute majority in the transportation sector. With the advent of technology, access to electricity, uncertainties in fuel prices and health awareness, people worldwide are moving towards a better, reliable, cost-effective and environmentally friendly mode of transportation, a hybrid electric vehicle. Such a vehicle, with its powerful electric motor and compact gasoline-based engine, offers better efficiency in terms of operating cost and reliability.

Considering the advent of hybrid electric vehicles taking pace, studies related to its architecture types, power flow dynamics, control and modelling of its various components will form an essential part of the automobile industry and research. This paper proposes a power flow topology for a hybrid electric vehicle with series-parallel architecture. The developed vehicle model with such an architecture type consists of three main sub-systems: the electrical system, the control system and the mechanical system. The presented power flow topology being modelled and analysed in detail in the Simulink tool is being implemented via a mode logic controller, which forms part of the central control system. The developed hybrid electric vehicle model demonstrates various modes of operation, from starting to accelerating to de-accelerating and then finally coming to a complete rest. Each mode yields and explains the following: the vehicle reference speed; the engine and generator turn functions on/off; the dc bus and battery voltage; the motor, battery, and generator current; the motor, generator, and engine speed; engine torque; engine power; throttle demand; and the vehicle's actual speed. The results thus obtained show that the waveforms associated with such topology, during its various modes of operation, are pretty stable and acceptable, thereby depicting and validating the operation of the developed hybrid electric vehicle model with proposed power flow topology in a precise and transparent manner.



Synthesis of zinc oxide nanoparticles using *Eucalyptus globulus* leaf extract

Renewable Energy Focus
Iqbal et al., (2023) 47:100505

A Dual Source 13 Level Inverter with Reduced Component Count for Renewable Energy Applications

Hasan Iqbal[a,b], **Md Ibrahim[c]**, Mohammad Tayyab[b,d], Adil Sarwar[b], Mohd Tariq[a,b], Mohammad Sarfraz[b]

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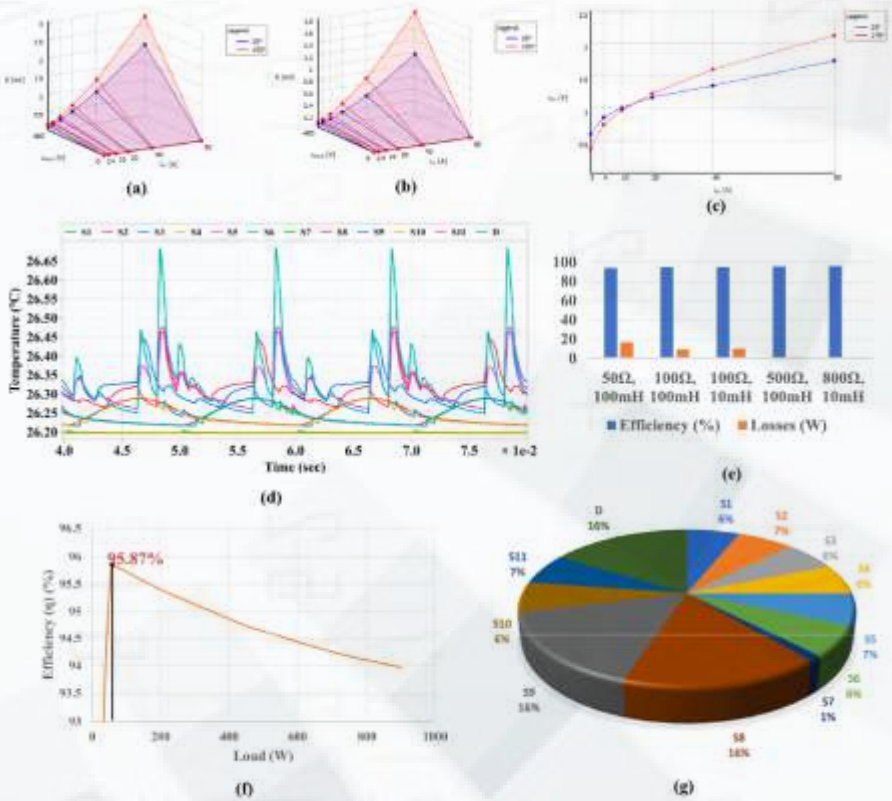
I.F. 4.2

An innovative multilevel inverter (MLI) relying on switched capacitor (SC) architecture is suggested for single-phase inverters with 13-levels. This suggested SCMLI is expected to be capable of generating output AC voltages at appropriate levels while utilizing fewer switches. The suggested inverter utilizes two count of capacitors, two asymmetrical dc sources, two diodes, and 11 switches. As fewer switches are needed, fewer gate drivers are also needed, increasing the converter's power density. The challenge of preserving self-voltage balance across the capacitors in an SC-MLI circuit is yet another task.

Additionally, when the modulation index is low, self-voltage preservation is subpar. It is possible to maintain the self-voltage balance with the capacitors connected in this suggested SC-MLI avoiding the requirement of any ancillary devices or challenging control schemes. Regardless of the modulation index values, capacitors operate at self-balanced levels in all regions of the spectrum. The suggested SC-MLI has a strong ability to achieve good power quality and can balance capacitor voltages even at low modulation indices. The suggested SC-MLI is first modelled using different loading conditions in the MATLAB/Simulink® platform, and subsequently it is validated with the help of typhoon-HIL real-time emulator. Using the simulation tool PLEXIM-PLECS, the suggested inverter's overall switching losses and efficiency are estimated and found out to be 95.87%.



Hardware setup used for SMO-GMPPT validation

Materials Science in Semiconductor Processing
Ansari et al., (2024) 173:108087

Green synthesis of zinc oxide marigold shaped clusters using Eucalyptus globulus leaf extract as robust photocatalyst for dyes degradation under sunlight

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I.F. 4.2

This paper reports a facile route to synthesis of zinc oxide (ZnO) nanoparticles assembled into marigold shaped clusters utilizing the *Eucalyptus globulus* leaf extract. Synthesized ZnO marigold shaped clusters were examined as catalyst for photocatalytic degradation of non-degradable organic dyes under the natural sunlight. The structural properties of as-synthesized ZnO marigold shaped clusters were demonstrated by powder-X-ray diffraction confirming the high crystallinity with hexagonal phase. Moreover, detailed structural and crystallographic analyses for as-synthesized ZnO marigold shaped clusters were analyzed through Rietveld refinement using FULLPROF software which further confirmed the wurtzite-type structure with P63mc space group. Field emission scanning electron microscopy was utilized to investigate the morphology of the synthesized ZnO, which revealed that nanoparticles assembled in clusters and eventually transformed into marigold shaped structures. Transmission electron microscopy analysis demonstrated that as-synthesized ZnO marigold shaped clusters consist of spherical and hexagonal nanoparticles with average crystallite size of 6 ± 2 nm. The role of *Eucalyptus globulus* leaf extract for the formation of ZnO clusters was discussed in detail by the plausible reaction mechanism. As-synthesized ZnO marigold shaped clusters exhibited the excellent photocatalytic behavior by observing almost 98 % photocatalytic performance towards organic dyes under open air sunlight condition. The aim of such investigation of the synthesized ZnO clusters has potential as solar based photocatalytic application towards efficient degradation of organic dyes.

Schematic presentation to the synthesis of ZnO marigold shaped clusters.

International Biodeterioration & Biodegradation
Sharma et al., (2024) 194:105861

Harnessing microbial potentials by advancing bioremediation of PAHs through molecular insights and genetics

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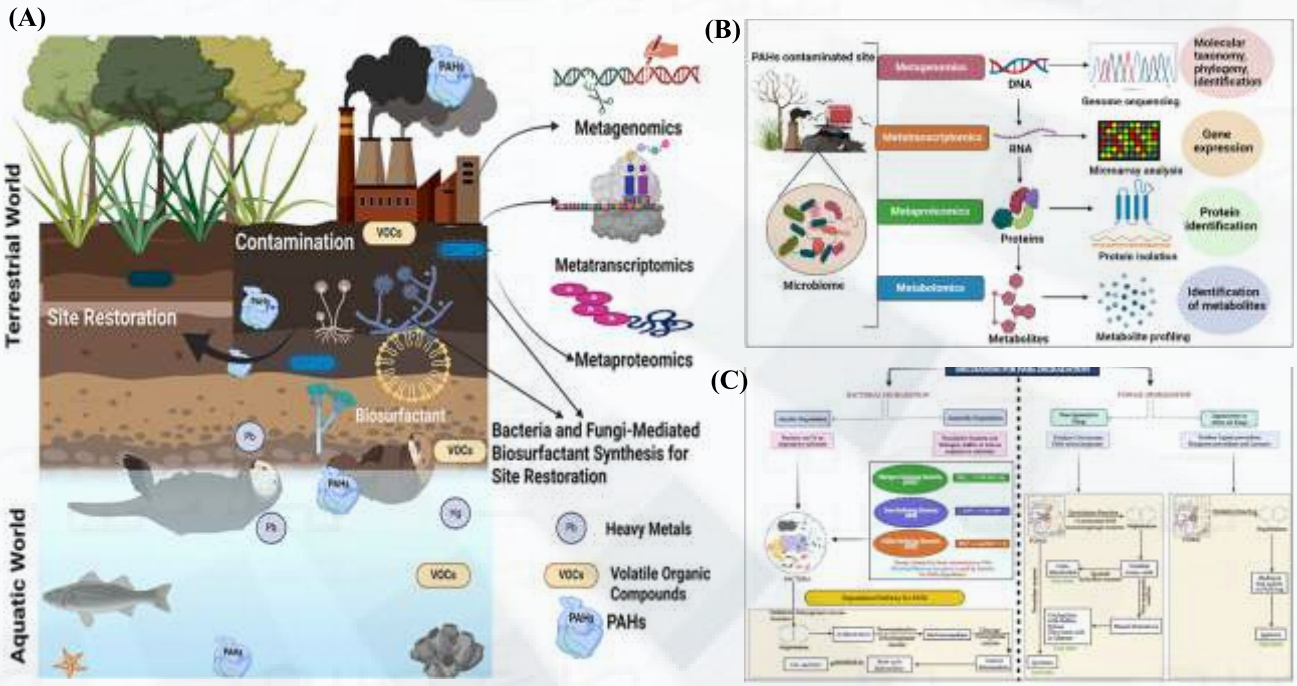
I.F. 4.1

This article covers the advancements and challenges in microbial remediation of polyaromatic hydrocarbons (PAHs), which are highly concerning pollutants due to their detrimental impacts on the environment and human health. It highlights the need for effective remediation methods in the face of rapid industrialization and expanding economies. Among the various approaches studied, microbial remediation has emerged as a promising, environmentally friendly, cost-effective, and sustainable strategy. However, the efficacy of microbial remediation is hindered by factors such as the ageing in the environment, toxicity of PAHs to microbial populations, the identification of more effective degradative enzymes, and the proliferation rate of degradative microbial strains in contaminated environments. Another constrain in biodegradation is the bioavailability of the PAHs which is primarily limited due to its low aqueous solubility and complex chemical structure. To address these challenges, innovative techniques such as multi-omics and genetic engineering have been employed to discover novel dehydrogenases and dioxygenases like catechol 2,3-dioxygenase gene responsible for PAHs degradation. The addition of microbial derived biosurfactants can be employed to address a major issue of PAHs bioavailability. Despite significant progress, the restoration of contaminated sites remains challenging due to the unfavourable environmental conditions encountered in real-world scenarios. This comprehensive communication aims to draw global attention to the hazardous nature of PAHs and shed light on the existing research gaps in order to guide future research endeavours in PAH degradation and remediation.



Bioremediation of PAHs using microbes

Frontiers in Plant Science
Kumar et al., (2023) 14:1225234

Drought and salinity stresses induced physio-biochemical changes in sugarcane: an overview of tolerance mechanism and mitigating approaches

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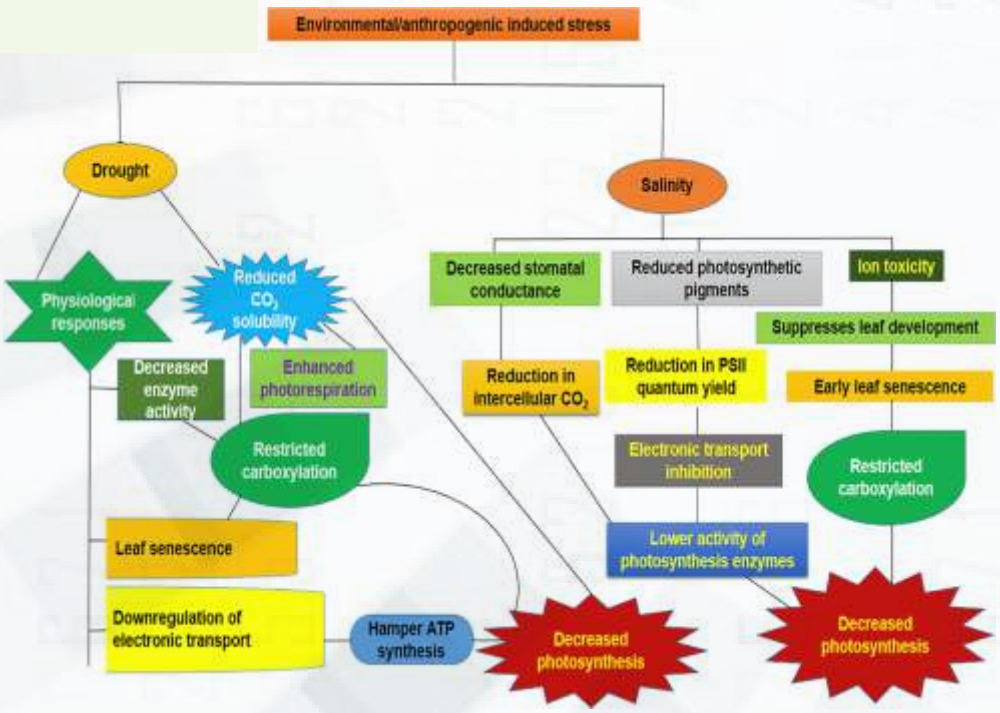
I.F. 4.1

Sugarcane productivity is being hampered globally under changing environmental scenarios like drought and salinity. The highly complex nature of the plant responses against these stresses is determined by a variety of factors such as genotype, developmental phase of the plant, progression rate and stress, intensity, and duration. These factors influence plant responses and can determine whether mitigation approaches associated with acclimation are implemented. In this review, we attempt to summarize the effects of drought and salinity on sugarcane growth, specifically on the plant's responses at various levels, viz., physiological, biochemical, and metabolic responses, to these stresses. Furthermore, mitigation strategies for dealing with these stresses have been discussed. Despite sugarcane's complex genomes, conventional breeding approaches can be utilized in conjunction with molecular breeding and omics technologies to develop drought- and salinity-tolerant cultivars. The significant role of plant growth-promoting bacteria in sustaining sugarcane productivity under drought and salinity cannot be overlooked.



Consequence of drought and salinity on the photosynthetic performance. Downregulation of enzymatic activity as well as electron transport chain (ETC) that leads to rupture of membrane, reduced CO2 availability, and senescence of leaf are the events taking place under drought stress. In contrast, salinity leads to ion toxicity, disruption of membrane, reduction in stomatal conductance, lower PSII quantum yield, and slower electron transport rate, which will, in turn, reduce the photosynthetic enzyme activity.

Frontiers in Microbiology
Kumar et al., (2023) 14:1214680

Stenotrophomonas in diversified cropping systems: friend or foe?

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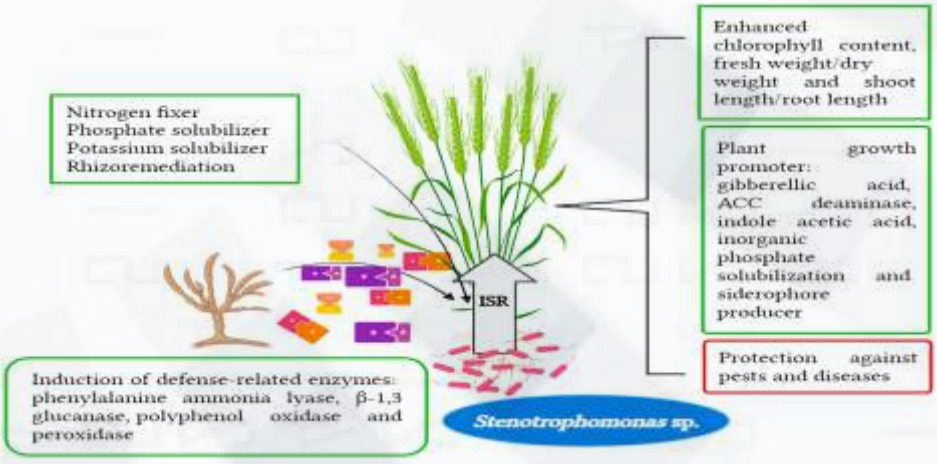
I.F. 4.0

In the current scenario, the use of synthetic fertilizers is at its peak, which is an expensive affair, possesses harmful effects to the environment, negatively affecting soil fertility and beneficial soil microfauna as well as human health. Because of this, the demand for natural, chemical-free, and organic foods is increasing day by day. Therefore, in the present circumstances use of biofertilizers for plant growth-promotion and microbe-based biopesticides against biotic stresses are alternative options to reduce the risk of both synthetic fertilizers and pesticides. The plant growth promoting rhizobacteria (PGPR) and microbial biocontrol agents are ecologically safe and effective. Owning their beneficial properties on plant systems without harming the ecosystem, they are catching the widespread interest of researchers, agriculturists, and industrialists. In this context, the genus *Stenotrophomonas* is an emerging potential source of both biofertilizer and biopesticide. This genus is particularly known for producing osmoprotective substances which play a key role in cellular functions, i.e., DNA replication, DNA-protein interactions, and cellular metabolism to regulate the osmotic balance, and also acts as effective stabilizers of enzymes. Moreover, few species of this genus are disease causing agents in humans that is why; it has become an emerging field of research in the present scenario. In the past, many studies were conducted on exploring the different applications of *Stenotrophomonas* in various fields, however, further researches are required to explore the various functions of *Stenotrophomonas* in plant growth promotion and management of pests and diseases under diverse growth conditions and to demonstrate its interaction with plant and soil systems. The present review discusses various plant growth and biocontrol attributes of the genus *Stenotrophomonas* in various food crops along with knowledge gaps. Additionally, the potential risks and challenges associated with the use of *Stenotrophomonas* in agriculture systems have also been discussed along with a call for further research in this area.



Multi-fold action of Stenotrophomonas spp. in plant system.

Journal of Molecular Structure
Shamina et al., (2024) 1305:137737

Molecular structure prediction, experimental and theoretical properties, and biological activities of (E)-5-nitro-3-(phenylimino) indolin-2-one-in-vitro against 60 lethal tumour cell lines

Herlin Shamina[a,b], V. Bena Jothy[b,c,*], **Mohd Asif**[d], **Malik Nasibullah**[d], Shine Kadaikunnan[e], Naiyf S. Alharbi[e], A. Manikandan[f,g], S. Muthu[h,**]

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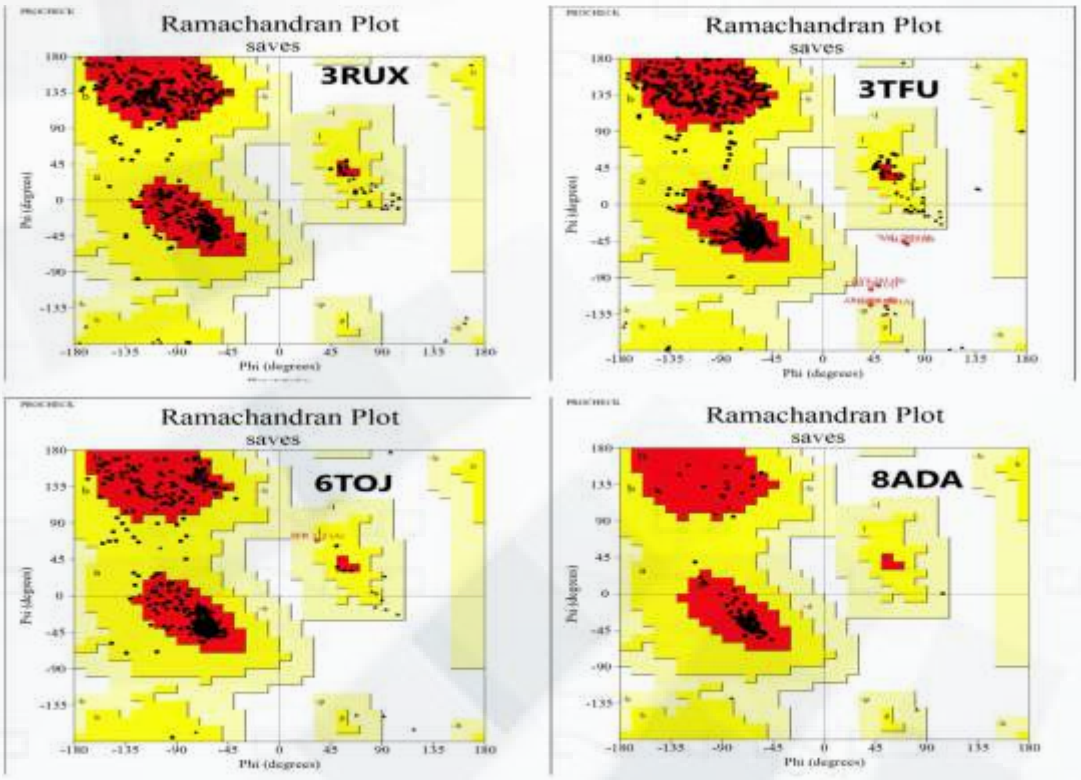
I.F. 4.0

In this study an isatin derivative (E)-5-nitro-3-(phenylimino) indolin-2-one (5NPI) has been synthesized and examined utilizing quantum chemical calculations of DFT approach for structural optimization, electronic and vibrational characteristics. Functional groups have been detected using FT-IR spectra and compared with simulated spectra. To model UV–vis absorption and identify electronic characteristics in solvents and gas phase, TD-DFT computations have been performed. The GIAO technique was used to measure chemical shifting in NMR in several different solvents. Theoretical parameters coincide perfectly with experimental data. HOMO and LUMO band gaps reflect chemical activity and have satisfactory charge exchange inside the molecule. RDG analysis, topological and NBO investigations have been used to study weak intermolecular interactions. Reactive regions of the 5NPI compound have been determined using MEP and Fukui functions. NLO behavior has been computed using hyperpolarizability parameters. The anticancer activities of the compound 5NPI were evaluated from the National Cancer Institute (NCI), USA and subjected to in-silico analysis such as drug-likeness, ADMET and molecular docking. The compound 5NPI has been docked with 3RUX, 8ADA, 3TFU and 6TOJ proteins and showed moderate binding affinity as - 7.14, - 6.42, - 6.68 and - 8.41 kcal/mol respectively. Compound 5NPI is used as a lead molecule in the treatment of TB along with various tumors.



Ramachandran plot of target proteins.

Journal of Molecular Structure
Reeda et al., (2023) 1294:136310

Synthesis, functional group analysis (experimental and theoretical), solvent –Solute interactions, structural insights of (E)-3-(4-chloro-3-(trifluoromethyl) phenyl) imino) indolin-2-one–In-vitro Antimicrobial activity

V.S. Jeba Reeda[a,c], V. Bena Jothy[b,c,*], **Mohd Asif**[d], **Malik Nasibullah**[d], Shine Kadaikunnan[e], Ghulam Abbas[f], S. Muthu[g,*]

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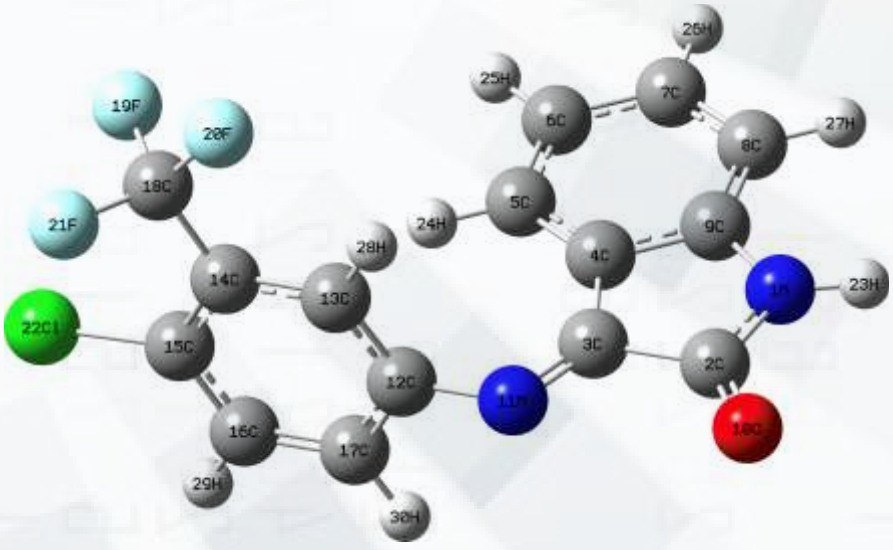
I.F. 4.0

(*E*)-3-(4-chloro-3-(trifluoromethyl) phenyl) imino) indolin-2-one (4CTFI) has been synthesised and its structural synthesised and its structural features have been investigated by spectroscopic (FT-IR, FT-Raman, NMR and UV–vis) techniques. 4CTFI was optimized in gas phase, PA (polar aprotic), PP (polar protic) and NP (nonpolar) solvent phases using WB97XD/6- 311++G(d,p) method. Vibrational assignments pertaining to different modes of vibration with potential energy distribution (PED) have been augmented by normal coordinate analysis (NCA). Using natural bond orbital (NBO) analysis, the compound's electronic stability as a consequence of hyper conjugative couplings and charge delocalization has been assessed. The Fukui functions and Molecular Electrostatic Potential (MEP) surface have been utilized to provide information about the nucleophilic and electrophilic locations for the aforesaid phases. The frontier molecular orbital (FMO) energy gap probably indicates a compound's strong chemical reactivity and enables eventual charge transfer inside the molecule. Furthermore, electron-hole distributions for four excited states and topological studies have been discussed. Moreover, this chemical adheres to Lipinski's decree, which implies that, in concept, consuming an oral intake will not be troublesome. ADMET (Absorption, Distribution, Metabolism, Excretion and Toxicity) attributes have been investigated to evaluate drug discovery initiatives of our synthetic molecule. Docking of 4CTFI with antimicrobial proteins have been performed and the minimum binding energy of -6.52 kcal/mol was obtained for 4WAS protein. Macromolecule flexibility and stability on protein-ligand interactions have been effectively studied using the molecular dynamics simulation. Tests of in-vitro antimicrobial efficacy have been performed on microbial strains.



Optimized structure of 4CTFI and atoms labeling.

Journal of Molecular Structure
Gupta et al., (2023) 1293:136276

Synthesis, DFT and Molecular docking studies in search of antimicrobial activity of (E)-4-((2-carbamothioylhydrazineylidene) methyl) benzoic acid

Sakshi Gupta[a,*], Sandhya Savita[b], Ajay Prakash[c], **Tahmeena Khan**[d], Satya[a], Kulsum Hashmi[a], Seema Joshi[a,*]

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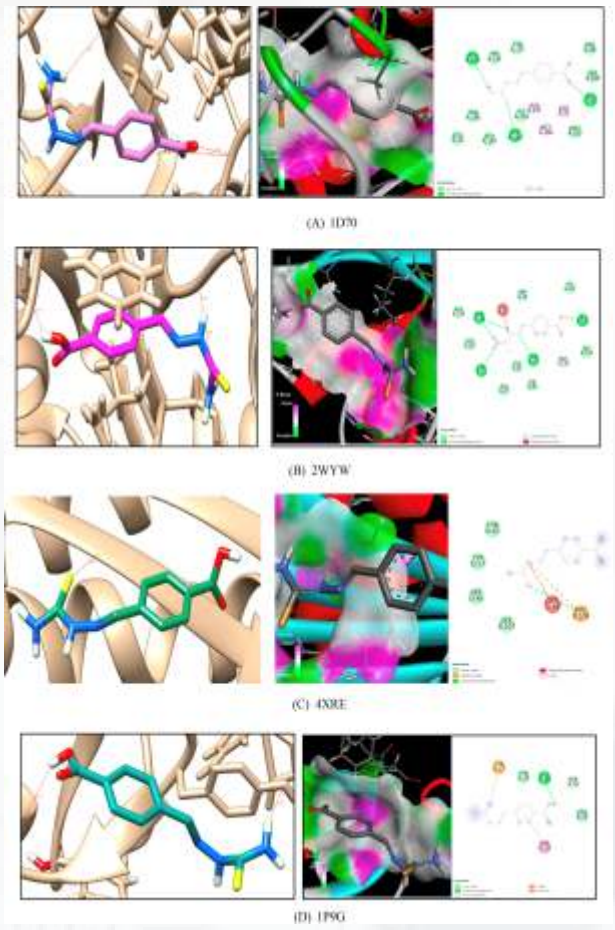
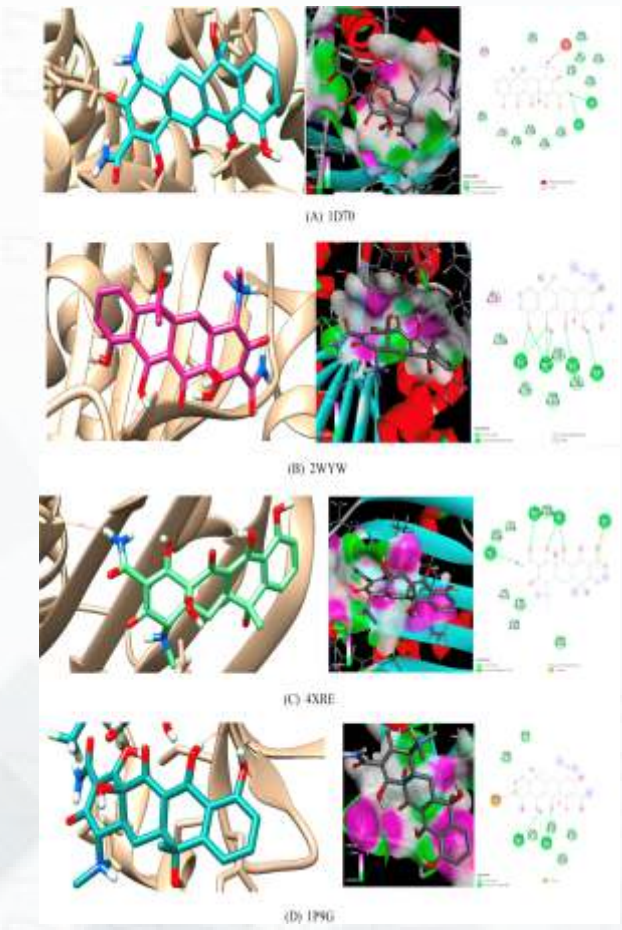
I.F. 4.0

The bioactive molecule (E)-4-((2 carbamothioylhydrazineylidene) methyl)benzoic acid (ligand), was synthesized and analysed spectroscopically (ESI-MS, FT-IR, 1H and 13C–NMR, UV–Vis) and quantum chemically by density functional theory approach (DFT). When compared to the experimental spectra, the computational results for FT-IR, NMR (1H and 13C), and UV-Vis were found to be in good agreement. When four antimicrobial Enoyl-Acyl Carrier Protein Reductases were docked with the ligand nicotinamide-adenine-dinucleotide (NADH) (PDBID:1D7O) exhibited the lowest binding energy (-7.2 kcal/mol). The drug-likeness studies were also performed to check drug like nature of the molecule which showed good bioavailability score. The antibacterial activity of the synthesized ligand was tested against four bacterial species with Salmonella sp. showing the highest zone of inhibition.



Ligand embedded in the active sites of (A) 1D70, (B) 2WYW, (C) 4XRE, and (D) 1P9G Proteins.



Tetracycline embedded in the active sites of the proteins (A)1D70, (B)2WYW, (C)4XRE, and (D)1P9G.

Plants
Meddya et al., (2023) 12(19):3380

Review

Plant Stomata: An Unrealized Possibility in Plant Defense against Invading Pathogens and Stress Tolerance

Sandipan Meddya[1], Shweta Meshram[1,*], **Deepranjan Sarkar[2]**, Rakesh S[3], Rahul Datta[4], Sachidanand Singh[5], Gosangi Avinash[6], Arun Kumar Kondeti[7], Ajit Kumar Savani[8] and Thiyagarajan Thulasinathan[9]

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[5]*Department of Biotechnology, Smt. S. S. Patel Nootan Science and Commerce College, Sankalchand Patel University, Visnagar 384315, India*
[6]*Department of Biochemistry, Punjab Agricultural University, Ludhiana 141027, India*
[7]*Department of Agronomy, Acharya N.G. Ranga Agricultural University, Regional Agricultural Research Station, Nandyal 518502, India*
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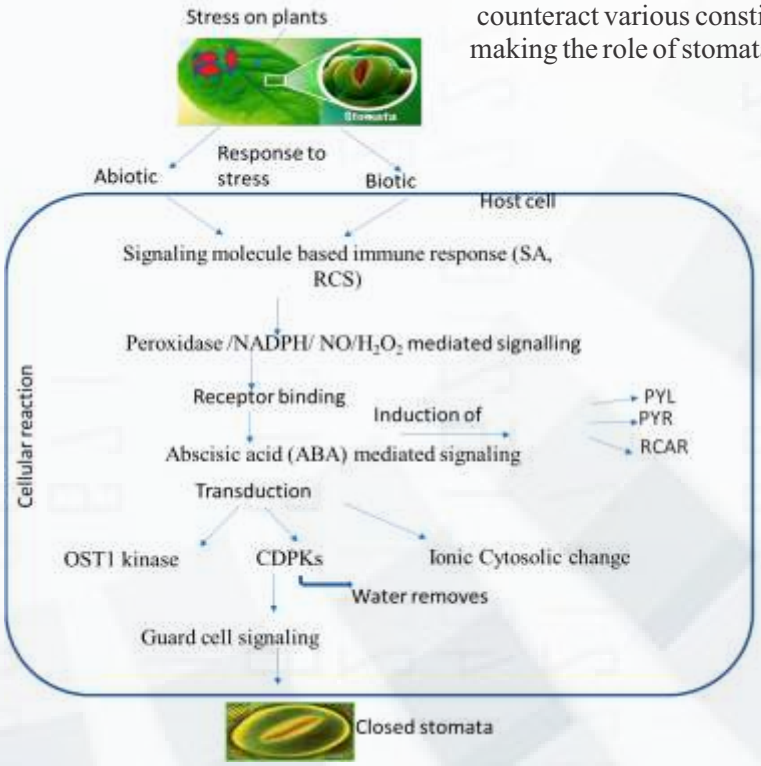
I.F. 4.0

Stomata are crucial structures in plants that play a primary role in the infection process during a pathogen's attack, as they act as points of access for invading pathogens to enter host tissues. Recent evidence has revealed that stomata are integral to the plant defense system and can actively impede invading pathogens by triggering plant defense responses. Stomata interact with diverse pathogen virulence factors, granting them the capacity to influence plant susceptibility and resistance. Moreover, recent studies focusing on the environmental and microbial regulation of stomatal closure and opening have shed light on the epidemiology of bacterial diseases in plants. Bacteria and fungi can induce stomatal closure using pathogen-associated molecular patterns (PAMPs), effectively preventing entry through these openings and positioning stomata as a critical component of the plant's innate immune system; however, despite this defense mechanism, some microorganisms have evolved strategies to overcome stomatal protection. Interestingly, recent research supports the hypothesis that stomatal closure caused by PAMPs may function as a more robust barrier against pathogen infection than previously believed. On the other hand, plant stomatal closure is also regulated by factors such as abscisic acid and Ca^{2+}-permeable channels, which will also be discussed in this review. Therefore, this review aims to discuss various roles of stomata during biotic and abiotic stress, such as insects and water stress, and with specific context to pathogens and their strategies for evading stomatal defense, subverting plant resistance, and overcoming challenges faced by infectious propagules. These pathogens must navigate specific plant tissues and counteract various constitutive and inducible resistance mechanisms, making the role of stomata in plant defense an essential area of study.



Putative overview of stomatal-mediated defense against plant pathogens at cellular level induced by ABA. Biotic and abiotic stresses induce signaling molecules, and ion generation take place, which subsequently induces ABA. ABA binds to receptors, which leads to a change in the equilibrium of *OST1* kinase and calcium ions that ultimately leads to stomatal closure.

Plants
Saeed et al., (2023) 12(19):3351

Exploring the Effects of Selenium and Brassinosteroids on Photosynthesis and Protein Expression Patterns in Tomato Plants under Low Temperatures

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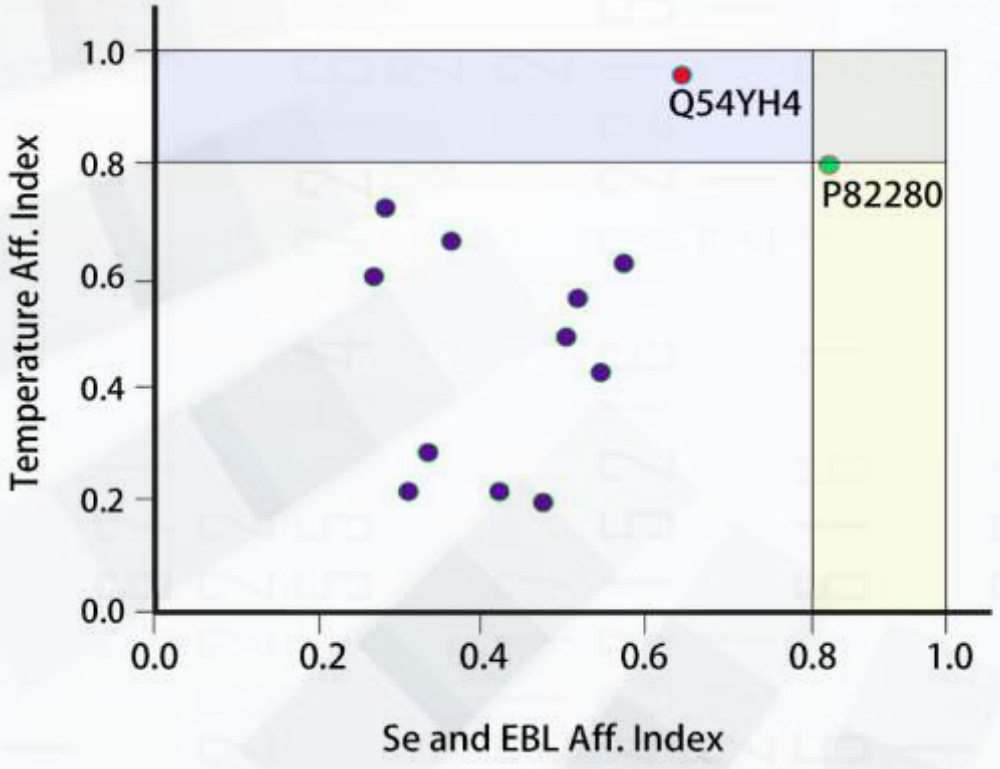
[5]*Plant Physiology and Biochemistry Section, Department of Botany, Faculty of Life Sciences, Aligarh Muslim University, Aligarh 202002, India; qazi_farid@yahoo.com*
[6]*University Institute of Biotechnology, Chandigarh University, Mohali 140413, India*

I.F. 4.0

This study aimed to assess the effects of low-temperature stress on two tomato cultivars (S-22 and PKM-1) treated with 24-epibrassinolide (EBL) and selenium (Se) by determining the changes in the proteomics profiles, growth biomarkers, biochemical parameters, and physiological functions. The growth parameters, photosynthetic traits, and activity of nitrate reductase in the S-22 and PKM-1 plants were markedly reduced by exposure to low temperatures. However, the combined application of EBL and Se under different modes significantly enhanced the aforementioned parameters under stress and non-stress conditions. Exposure to low temperatures increased the activities of the antioxidant enzymes (catalase, peroxidase, and superoxide dismutase) and the proline content of leaves, which were further enhanced by treatment with Se and EBL in both varieties. This research sheds light on the potential for employing exogenous EBL and Se as crucial biochemical tactics to assist tomato plants in surviving low-temperature stress. Moreover, the differentially expressed proteins that were involved in plant metabolism following the combined application of EBL and Se under low-temperature stress were additionally identified. Functional analysis revealed that the Q54YH4 protein plays an active role against plant stressors. The conserved regions in the protein sequences were analyzed for assessing the reliability of plant responses against the external application of EBL and Se under low temperatures.



Principal component analysis (PCA) of the S-22 and PKM-1 varieties of tomato.

World Journal of Microbiology and Biotechnology
Dubey et al., (2024) 40(5):151

Microbial innovations in chromium remediation: mechanistic insights and diverse applications

Priya Dubey[1,2], **Alvina Farooqui**[1], Anju Patel[2], Pankaj Kumar Srivastava[2]

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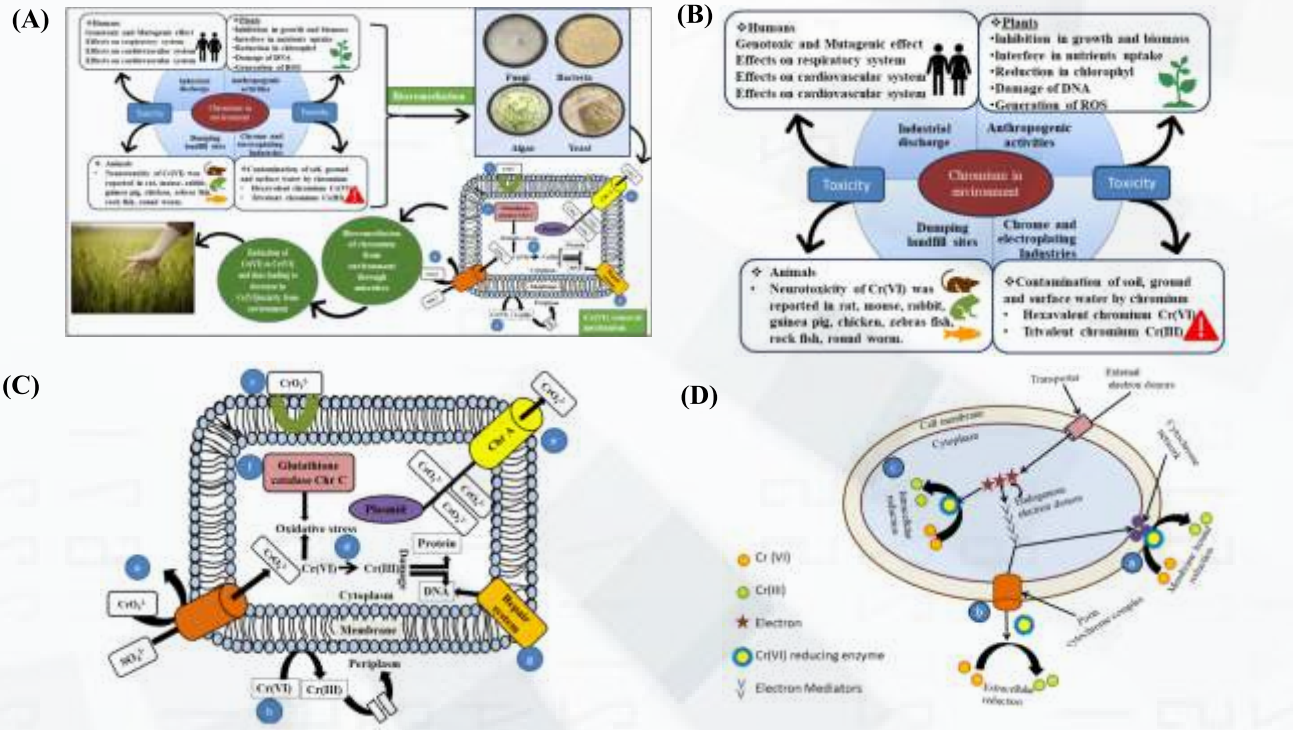
[2]*Environmental Technologies, CSIR-National Botanical Research Institute, Lucknow, India.*

I.F. 4.0

The ubiquity of hexavalent chromium (Cr(VI)) from industrial activities poses a critical environmental threat due to its persistence, toxicity and mutagenic potential. Traditional physico-chemical methods for its removal often entail significant environmental drawbacks. Recent advancements in remediation strategies have emphasized nano and bioremediation techniques as promising avenues for cost-effective and efficient Cr(VI) mitigation. Bioremediation harnesses the capabilities of biological agents like microorganisms, and algae to mitigate heavy metal contamination, while nano-remediation employs nanoparticles for adsorption purposes. Various microorganisms, including E. coli, Byssochlamys sp., Pannonibacter phragmitetus, Bacillus, Aspergillus, Trichoderma, Fusarium, and Chlorella utilize bioreduction, biotransformation, biosorption and bioaccumulation mechanisms to convert Cr(VI) to Cr(III). Their adaptability to different environments and integration with nanomaterials enhance microbial activity, offering eco-friendly solutions. The study provides a brief overview of metabolic pathways involved in Cr(VI) bioreduction facilitated by diverse microbial species. Nitroreductase and chromate reductase enzymes play key roles in nitrogen and chromium removal, with nitroreductase requiring nitrate and NADPH/NADH, while the chromium reductase pathway relies solely on NADPH/NADH. This review investigates the various anthropogenic activities contributing to Cr(VI) emissions and evaluates the efficacy of conventional, nano-remediation, and bioremediation approaches in curbing Cr(VI) concentrations. Additionally, it scrutinizes the mechanisms underlying nano-remediation techniques for a deeper understanding of the remediation process. It identifies research gaps and offers insights into future directions aimed at enhancing the real-time applicability of bioremediation methods for mitigating with Cr(VI) pollution and pave the way for sustainable remediation solutions.



Schematic diagram of a proteomic experimental condition. Samples derived from all the four groups were digested with Trypsin/Lys-C mix of mass spec-grade for label-free quantification.

Asia Pacific Journal of Marketing and Logistics
Rehman et al., (2024) DOI: 10.1108/APJML-12-2023-1237

How semiotic product packaging, brand image, perceived brand quality influence brand loyalty and purchase intention: a stimulus-organism-response perspective

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[2]***Department of Business Management, Integral University, Lucknow, India***

I.F. 3.9

Purpose : The present study, underpinned by the stimulus-organism-response (SOR) theory, aims to examine the impact of packaging semiotics on brand image, perceived brand quality, brand loyalty and purchase intention of well-established food brands.

Design/methodology/approach

A self-administered questionnaire was disseminated to participants residing in the Lucknow region of India. We conducted an experiment in which 374 participants evaluated the factors on a stimulus (chips packaging) using an online survey. Collected data were analysed through structural equation modelling (SEM).

Findings : The result suggests that packaging semiotics exhibits a positive influence on brand image and perceived brand quality of consumers. The brand image significantly impacts brand loyalty and consumers' purchase intention. In addition, the perceived brand quality has a positive significant impact on brand loyalty, but a negative and insignificant influence on purchase intention. The results show that both brand image and perceived brand quality significantly mediate the relation between packaging semiotics and brand loyalty. Brand image significantly mediates but perceived brand quality does not mediate the relation between packaging semiotics and purchase intention.

Practical implications : The results of the study will assist food brands in determining how to utilise semiotics in packaging to positively influence brand image, perceived brand quality, brand loyalty and consumers' intent to purchase.

Originality/value : The study is unique in the sense that it assesses the role of packaging semiotics as antecedent in mapping of brand loyalty and purchase intention through brand image and perceived product quality. This study takes a lead as these constructs have been less explored relatively from the lens of packaging semiotics in an emerging Asian market

Scientia Horticulturae
Yusuf et al., (2024) 323:112453

Melatonin improved efficiency of 24-epibrassinolide to counter the collective stress of drought and salt through osmoprotectant and antioxidant system in pea plants

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I.F. 3.9

Plant hormones and several small signalling molecules are known to provide tolerance against various abiotic stresses. The individual contributions of 24-Epibrassinolide (EBL) and Melatonin (ML) in enhancing plant tolerance to different abiotic stresses have been well-documented, but their combined effect in alleviating the impact of combined stress remains unexplored. In this study, joint effect of EBL and ML has been tested on growth, photosynthesis, biochemical traits and oxidative stress markers in Pisum sativum (pea) plants exposed to combination of drought and salt stress. The individual application of EBL and ML exhibited nearly similar responses to both stresses. However, when EBL and ML were applied together, significant changes in growth, photosynthetic traits, proline accumulation, and activities of various antioxidant enzymes were observed in pea plants exposed to the combined stress of drought and salt. Enhanced level of antioxidant enzymes and accumulation of proline indicates mitigation of excess ROS elicited by joint application of EBL and ML that provides tolerance against combined stress of drought and salt in pea plants. This study indicates that joint application EBL and ML is an operational approach for mitigation of combined stress of drought and salt in plants and could be exploited for sustainable agricultural practices on the stressed soils.

Effect of 24-epibrassinolide (EBL) and/or melatonin (ML) on the Pisum sativum (pea) plants grown under combined stress of drought and salt

Water Resources Management
Maurya et al., (2023) 37:2675-2696

Future Climate Change Impact on the Streamflow of Mahi River Basin Under Different General Circulation Model Scenarios

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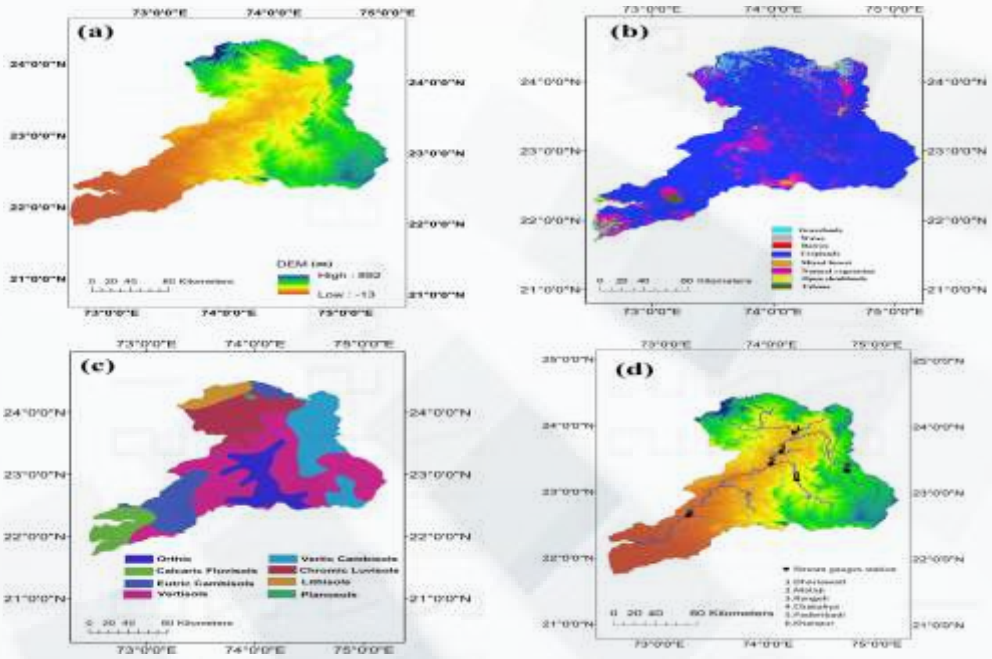
[4]***Department of Civil Engineering, Indian Institute of Technology Bombay, Powai 400076, India***

I.F. 3.9

Climate change (precipitation and temperature) has significantly affected the hydrological regimes and future climate projection. Integration of climate model with physical based model is crucial for quantitative measurement of changes in surface water regime. For accurate estimation, modelling framework need finer scale resolution of climate model output. In this study, we examined the bias corrected, statistically downscale models drawn from the NASA, Earth Exchange Global Daily Downscaled Projections–Coupled Model Intercomparison Project Phase 5 (NEX-GDDP-CMIP5) over the study region. The rainfall and temperature projection output from the INMCM-4, MRI-CGCM3 and their ensemble mean performed well over the Mahi River basin (MRB), India. In this study, the climate data integrated with the SWAT model to analyse the potential impact of climate change on the discharge of MRB. The finding indicates that in the near future (2011–2040) projection of annual average streamflow increases by 76.74% based on the INMCM-4 outputs, 25% based on the MRI-CGCM3 outputs, and 24.53% based on the ensemble mean in comparison to the baseline period (1981–2010). Further, the modelling results of mean monthly streamflow in rainy season indicated that the lowest and highest streamflow changes will be ranging from about 631.07–2718.42 m3/s as observed by INMCM-4, 491.71–2938 m3/s observedby MRI-CGCM3, 513.02–2270.18 m3/s observed by ensemble mean, in the near future. Similarly, in the summer season, the lowest level of stream flow is found to be 158.27 m3/s observed by MRI-CGCM3, 193.38 m3/s (ensemble mean) and 258.53 m3/s (INMCM-4), respectively. Additionally, the streamflow trend was assessed by Mann–Kendall and Sen's slope method at the monthly, seasonal and annual scales. The future streamflow projection represented the ascending trend observed in south west and winter monsoon, while the descending trend was observed in pre-monsoon and post-monsoon under the INMCM-4, MRI-CGCM3, and ensemble mean. Results on projected precipitation, temperature and streamflow accretion would help to develop effective adaptation measures for reducing the impacts of climate change and to work out long-term water resource management plans in the river basin.



Digital elevation model; b Land use and land cover; c Soil types; d and Stream gauges station of the study area

Chemical Physics Impact
Durgadevi et al., (2024) 8:100482

Quantum computational, molecular structure, experimental spectra, and molecular docking studies on (*S*)-3-benzyl-5-(phenylselanyl)-6-(p-tolyl)-3,4-dihydropyran-2-one

S. Durgadevi[a,b], C. Venkataraju[a], **Malik Nasibullah**[c], Mohd Asif[e], Bhoopendra Tiwari[d], A. Manikandan[e,f], E. Geetha[g], S. Muthu[h,*]

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[g]*Department of Mathematics, Sri Chandrasekharendra Saraswathi viswa Mahavidyalaya, Enathur, Kanchipuram - 631561, India*
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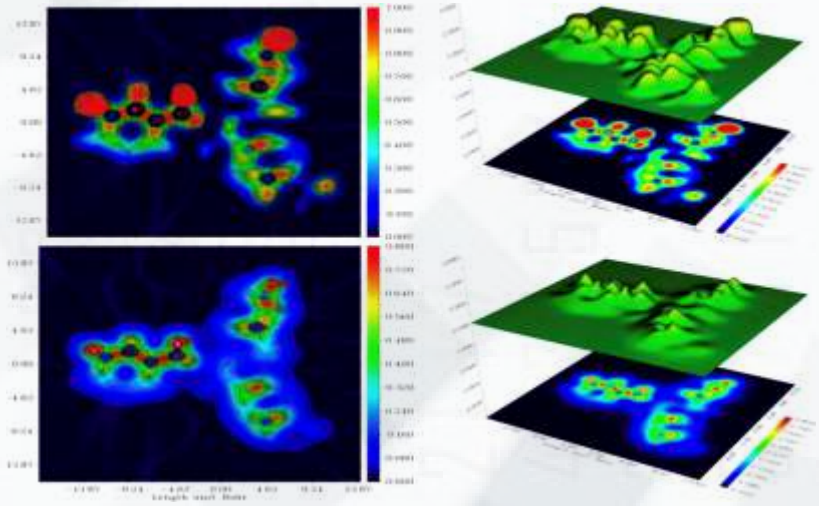
I.F. 3.8

The published molecule (*S*)-3-Benzyl-5-(phenylselanyl)-6-(p-tolyl)-3,4-dihydropyran-2-one (3B6PL) was selected for the identification of anticancer properties, and the computational calculations were employed using density function theory (DFT) with the B3LYP/6–311++*G* (d,p) basis set to validate the proposed molecular structure features by the theoretical computational calculations. Herein, the FT-IR, UV-800, 1H NMR, and 13C NMR analytical techniques were used for the characterization of the selected molecule. In FT-IR, the characteristic frequencies of the molecule were compared using an appropriate scaling factor (0.961) for the potential energy distribution (PED) and simulated spectra of 3B6PL. Moreover, UV-800 and NMR spectral data were validated using the NBO that was demonstrated to the charge transfer in the molecules and exhibits a prominent second-order perturbation energy, E(2) value is 309.85 kcal/mol. HOMO-LUMO, Molecular electrostatic potential (MEP) both find molecule's electrical properties, as well as its softness, hardness, and overall stability. To understand the reactive locations of the molecule, fukui functions have been employed. Moreover, the exceptional NLO (non-linear optical) characteristics of the molecule were demonstrated, and intermolecular interactions were evaluated using a Hirshfeld surface as well. On the contrary, the druglikeness of the molecule was evaluated under Lipinski's rule of five and ADME/T studies. *In-silico* analysis and molecular docking were also demonstrated for the anticancer potential of the proposed molecule against the kinase insert domain receptors of VEGFR and showed binding affinities of -6.3 kcal/mol for the VEGFR-ligand complex as a preliminary investigation. Therefore, this compound could be used *for in-vitro* and *in-vivo* analyses to find out its cytotoxicity and could also be derivatized to enhance its potent anticancer properties.



ELF and LOL colored diagram and contour maps.

SN Computer Science
Khan et al., (2024) 5: 84

Detecting Network Intrusion in Cloud Environment Through Ensemble Learning and Feature Selection Approach

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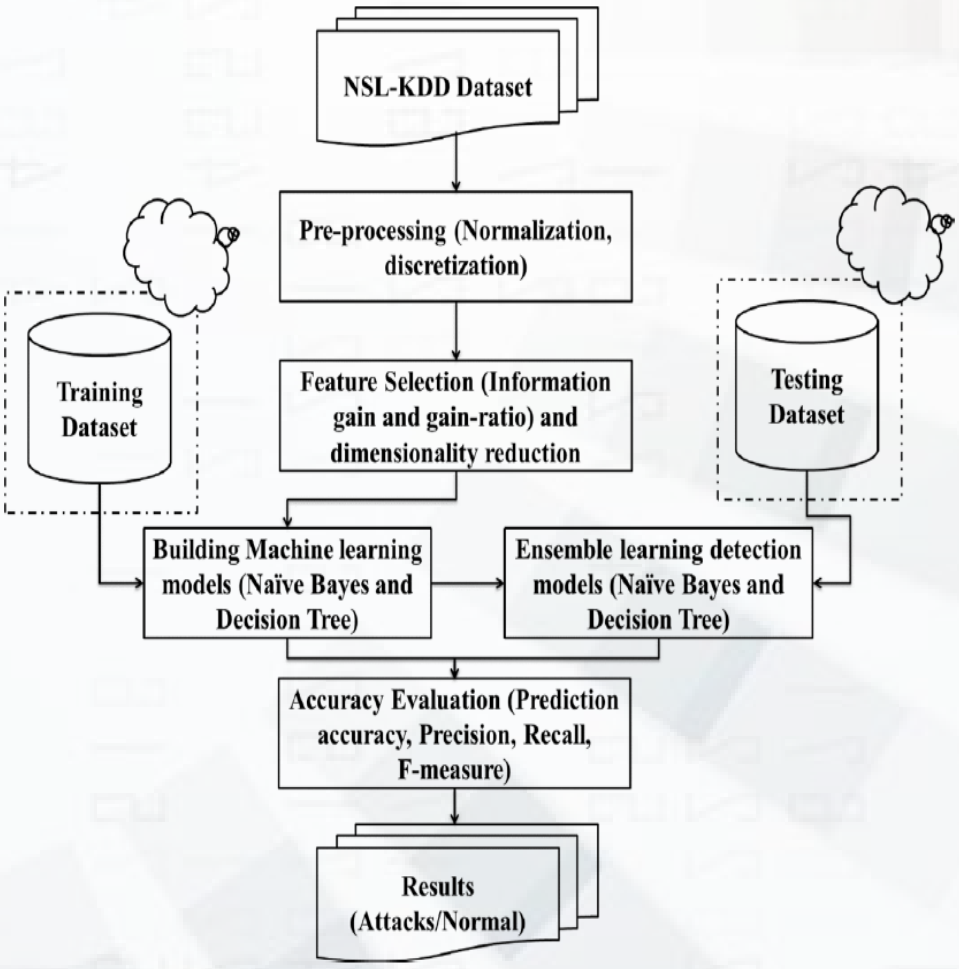
[1]Department of Computer Science and Engineering, Integral University, Lucknow, Uttar Pradesh, India

I.F. 3.78

The use of the Internet is enhanced drastically in the current era, which connects multiple computers in a network and a group of devices. In addition, every sector uses the Internet to communicate and send data digitally. However, the Internet is affected due to unwanted activities and cyber-attacks by attackers. Hence, intrusion detection systems have recently been used to detect incoming attacks. Therefore, the present study has designed and developed the intrusion detection scheme for cloud computing through ensemble learning and a feature selection approach. The proposed system is tested on NSL-KDD datasets. The critical features were selected from the dataset, and dimensionality was reduced using feature selection methods. The ensemble learning approach combined the single process to generate the robust way and successfully confirmed with high accuracy and negligible error rate. Two machine learning methods, such as decision tree and Naïve Bayes, have been used in training the ensemble learning models. The overall accuracy was 90 and 99%, with 9.61 and 0.21% error rates for Naïve Bayes and decision tree classifier, respectively. The present study can successfully detect network attacks and secure cloud-based platforms. The proposed approach is more stable and more accurate than the earlier research.



Detecting network intrusion in cloud environment

ACS Omega
Jabeen et al., (2024) 90(28):30190-30204

Biogenic Synthesis of Copper Oxide Nanoparticles from Aloe vera: Antibacterial Activity, Molecular Docking, and Photocatalytic Dye Degradation

Sabeeha Jabeen[1], Vasi Uddin Siddiqui[2,*], Shashi Bala[3], Nidhi Mishra[4], Anamika Mishra[4], Rubina Lawrence[5], Pratibha Bansal[2], **Abdul Rahman Khan**[1], and **Tahmeena Khan**[1,*]

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[2]*Advanced Engineering Materials and Composites Research Centre (AEMC), Department of Mechanical and Manufacturing Engineering, Universiti Putra Malaysia, UPM, Serdang, Selangor Darul Ehsan 43400, Malaysia*
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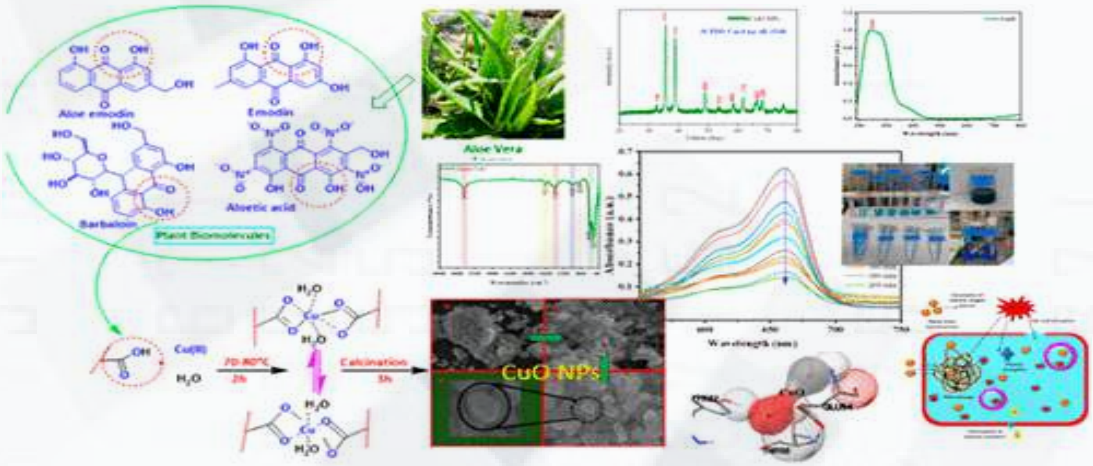
I.F. 3.7

Green synthesis methods offer a cost-effective and environmentally friendly approach to producing nanoparticles (NPs), particularly metal-based oxides. This study explores the green synthesis of copper oxide nanoparticles using Aloe vera (Aloe barbadensis Miller) leaf extract. The characterization revealed a unique sago-shaped morphology revealed by field-emission scanning electron microscopy and X-ray diffraction analysis. Distinctive metal−oxygen bonds at 521 and 601 cm−1 were confirmed by Fourier-transform infrared (FT-IR) spectroscopy. Furthermore, UV−visible spectroscopy revealed absorbance at 248 nm, suggesting electron transitions across energy bands and varying surface conduction electrons. The band gap value indicated the presence of quantum confinement effects, which were probably caused by the distinctive morphology and surface structure of the biogenic NPs. Additionally, molecular docking studies were carried out against key proteins of Salmonella typhi and Listeria monocytogenes, namely, listeriolysin O (PDB ID: 4CDB), internalin (InlA) (PDB ID: 1O6T), Salmonella effector protein (SopB) (PDB ID: 4DID), and YfdX (PDB ID: 6A07) using AutoDock 4.2. The results revealed binding energies against S. typhi and L. monocytogenes proteins, indicating potential interactions establishing the foundation for further in-depth understanding of the molecular basis underlying the observed antibacterial effects in vitro against S. typhi, Klebsiella pneumoniae, Pseudomonas aeruginosa, and L. monocytogenes. Antibacterial activity evaluation yielded impressive results, with CuO NPs displaying significant activity against S. typhi and L. monocytogenes, exhibiting zones of inhibition values of 13 Å} 0.02 and 15 Å} 0.04 mm, respectively. Moreover, the CuO NPs demonstrated remarkable photocatalytic efficacy, resulting in the degradation of 77% of the methylene blue dye when exposed to UV irradiation. This study highlighted the potential of green-synthesized CuO NPs derived from A. vera with their unique morphology, interesting spectroscopic properties, and promising antibacterial and photocatalytic activities.



ACS Omega
Bano et al., (2024) 9(25):26762-26779

Drug Repurposing of Selected Antibiotics: An Emerging Approach in Cancer Drug Discovery

Nilofer Bano[1], **Sana Parveen**[1], Mohd Saeed[2], Samra Siddiqui[3], Mohammad Abohassan[4], and **Snober S. Mir**[1*]

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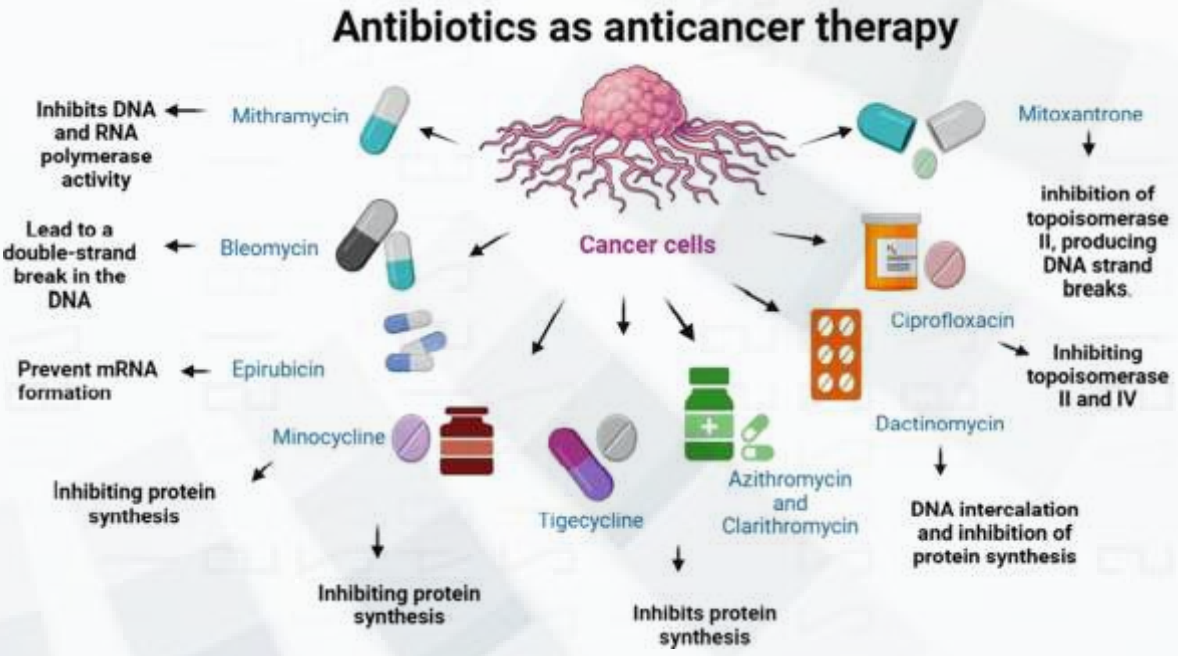
I.F. 3.7

Drug repurposing is a method of investigating new therapeutic applications for previously approved medications. This repurposing approach to "old" medications is now highly efficient, simple to arrange, and cost-effective and poses little risk of failure in treating a variety of disorders, including cancer. Drug repurposing for cancer therapy is currently a key topic of study. It is a way of exploring recent therapeutic applications for already-existing drugs. Theoretically, the repurposing strategy has various advantages over the recognized challenges of creating new molecular entities, including being faster, safer, easier, and less expensive. In the real world, several medications have been repurposed, including aspirin, metformin, and chloroquine. However, doctors and scientists address numerous challenges when repurposing drugs, such as the fact that most drugs are not cost-effective and are resistant to bacteria. So the goal of this review is to gather information regarding repurposing pharmaceuticals to make them more cost-effective and harder for bacteria to resist. Cancer patients are more susceptible to bacterial infections. Due to their weak immune systems, antibiotics help protect them from a variety of infectious diseases. Although antibiotics are not immune boosters, they do benefit the defense system by killing bacteria and slowing the growth of cancer cells. Their use also increases the therapeutic efficacy and helps avoid recurrence. Of late, antibiotics have been repurposed as potent anticancer agents because of the evolutionary relationship between the prokaryotic genome and mitochondrial DNA of eukaryotes. Anticancer antibiotics that prevent cancer cells from growing by interfering with their DNA and blocking growth of promoters, which include anthracyclines, daunorubicin, epirubicin, mitoxantrone, doxorubicin, and idarubicin, are another type of FDA-approved antibiotics used to treat cancer. According to the endosymbiotic hypothesis, prokaryotes and eukaryotes are thought to have an evolutionary relationship. Hence, in this study, we are trying to explore antibiotics that are necessary for treating diseases, including cancer, helping people reduce deaths associated with various infections, and substantially extending people's life expectancy and quality of life.



ACS Omega
Awasthi et al., (2024) 8(20):17788-17799

Synthesis, In Silico Studies, and In Vitro Anti-Inflammatory Activity of Novel Imidazole Derivatives Targeting p38 MAP Kinase

Archana Awasthi[1,2], **Md Azizur Rahman**[2], Mantripragada Bhagavan Raju[1]

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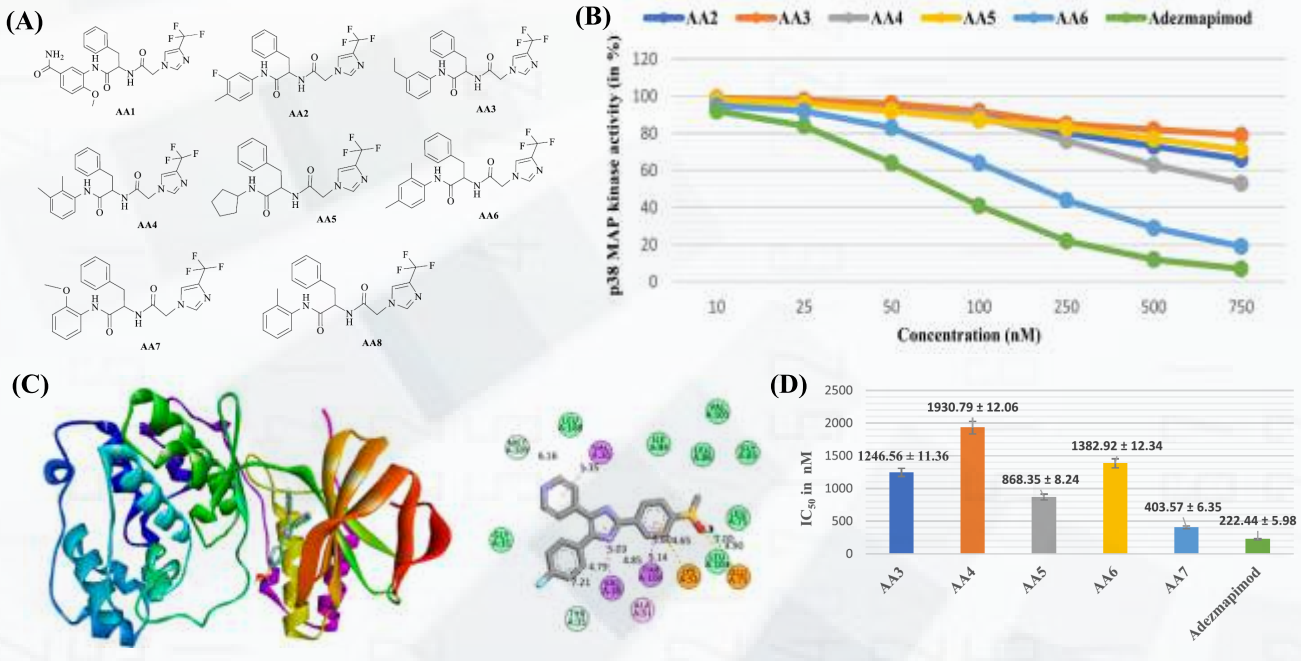
I.F. 3.7

A series of eight novel N-substituted [4-(trifluoro methyl)-1H-imidazole-1-yl] amide derivatives (AA1–AA8) were synthesized, characterized, and evaluated for their in vitro p38 MAP kinase anti-inflammatory inhibitory activity. The synthesized compounds were obtained by coupling [4-(trifluoromethyl)-1H-imidazole-1-yl] acetic acid with 2-amino-N-(Substituted)-3-phenylpropanamide derivatives utilizing 1-[bis(dimethylamino)methylene]-1H-1,2,3-triazolo[4,5-b] pyridinium 3-oxide hexafluorophosphate as a coupling agent. Various spectroscopic methods established and confirmed their structures, specifically, 1H NMR, 13C NMR, Fourier transform infrared (FTIR), and mass spectrometry. In order to emphasize the binding site of the p38 MAP kinase protein and newly synthesized compounds, molecular docking studies were carried out. In the series, compound AA6 had the highest docking score of 7.83 kcal/mol. The ADME studies were performed using web software. Studies revealed that all the synthesized compounds were orally active and showed good gastrointestinal absorption within the acceptable range. Lipinski's "rule of five" was used to determine drug-likeness. The synthesized compounds were screened for their anti-inflammatory activity by performing an albumin denaturation assay in which five compounds (AA2, AA3, AA4, AA5, and AA6) were found to exhibit substantial activity. Hence, these were further selected and proceeded for the evaluation of p38 MAP kinase inhibitory activity. The compound AA6 possesses considerable p38 kinase inhibitory anti-inflammatory activity with an IC50 value of 403.57 ± 6.35 nM compared to the prototype drug adezmapimod (SB203580) with an IC50 value of 222.44 ± 5.98 nM. Some further structural modifications in compound AA6 could contribute to the development of new p38 MAP kinase inhibitors with an improved IC50 value.



Modulation of p38 MAP Kinase by synthesized imidazole derivatives

Journal of the Franklin Institute
Lone et al., (2023) 360:13318-13338

Hyperchaotic image encryption using DNA coding and discrete cosine transform

Parveiz Nazir Lone[a], Umar Hussain Mir[b], **Abdul Gaffar**[c]

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[b]*Department of Mathematics, Central University of Jammu 181143 India*
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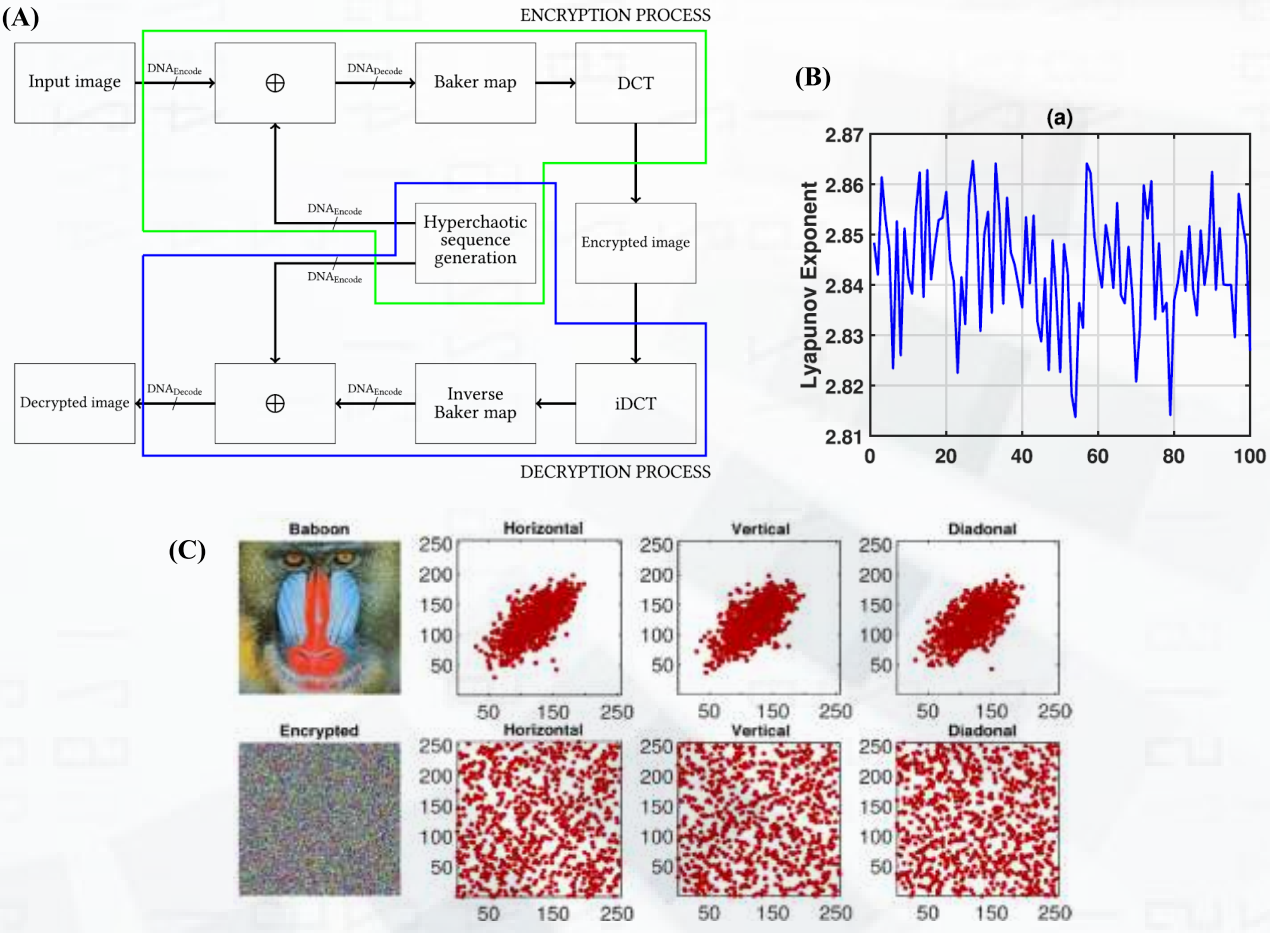
I.F. 3.7

Achieving privacy over sensitive data is challenging in digital communication. In an effort to realize this aim, we propose hyperchaotic image encryption through DNA (deoxyribonucleic acid) coding and the discrete cosine transform (DCT). This multi-layered security algorithm comprises advanced levels of confusion and multiple diffusion techniques. The diffusion among the pixel values is attained by employing DNA operations among pixel values and the random sequence generated from the hyperchaotic map. Thereafter, the data sequence is scrambled through the baker map in order to permute the data points. Later, the partially encrypted image is further diffused and compressed through the DCT for lightweight communication. The significant contribution of this algorithm is the excellent improved quality of encryption through a double chaotic DNA encoded scheme. The statistical results are competitive in support of the robustness of the scheme and have shown resistance against the underlying cryptanalytic attacks. The performance of the scheme is evaluated in terms of diverse metrics via entropy, correlation coefficient, PSNR (Peak Signal-to-Noise Ratio), Chi-squared values, etc., and are determined to be more efficient and outperforms some existing state of art techniques.



IEEE Transactions on Nanobioscience
Kumar et al., (2024) 23(2):336-343

Bimetal Thin Film, Semiconductors, and 2D Nanomaterials in SPR Biosensors: An Approach to Enhanced Urine Glucose Sensing

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[2]***Department of Electronics and Communication Engineering, Faculty of Engineering Integral University, Lucknow 226016, U.P. India***
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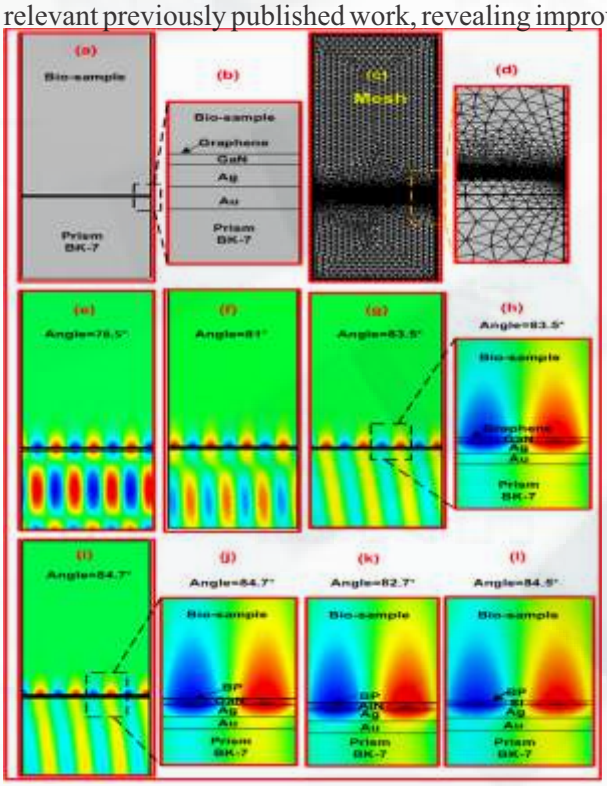
and, Instituto de Alta Investigacion, Universidad de Tarapaca, Casilla 7D, Arica, Chile.

I.F. 3.7

This work introduces a systematic approach for the development of Kretschmann configuration-based biosensors designed for non-invasive urine glucose detection. The methodology encompasses the utilization of various semiconductors, including Silicon (Si), Germanium (Ge), Gallium Nitride (GaN), Aluminum Nitride (AlN), and Indium Nitride (InN), in combination with a bimetallic layer (comprising Au and Ag films of equal thickness) to enhance the biosensor sensitivity. Additionally, 2D nanomaterials, such as Black Phosphorus and Graphene, are integrated into the semiconductor layers to enhance performance further. These configurations are meticulously optimized through the application of the transfer matrix method (TMM), and the sensing parameters are assessed using the angular modulation method. Among the semiconductors, AlN and GaN exhibit superior results. On these substrates, Graphene and Black phosphorous (BP) layers are applied, resulting in four final structures (thicknesses in nm): BK7/Au(26)/Ag(26)/Si(6)/BP(0.53)/Biosample, BK7/Au(26)/Ag(26)/AlN(14)/BP(0.53)/Biosample, BK7/Au(26)/Ag(26)/GaN(12)/BP(0.53)/Biosample, and BK7/Au(26)/Ag(26)/GaN(12)/Graphene(0.34)/Biosample. These biosensors achieve Sensitivity(◦ /RIU) and Figure of Merit (FoM) (1/RIU) of 380, 360, 440, 400, and 58.5, 90, 90.65, and 82.4, respectively. Subsequently, these high-performing sensors undergo testing with actual urine glucose samples. Among them, two biosensors, BK7/Au(26)/Ag(26)/AlN(14)/BP(0.53)/Biosample and BK7/Au(26)/Ag(26)/GaN(14)/Graphene(0.34)/Biosample, exhibit outstanding performance, with sensitivities (◦ /RIU) and FoM (1/RIU) of 394.44 & 294.44, and 112.6 & 92.01 respectively. A comparison is also made with relevant previously published work, revealing improved performance in glucose detection.



The biosensor structure utilizing GaN/Graphene layer over bimetal: (a) Simulated structure, (b) a magnified image of a small section of the simulated structure that shows six layers, (c) Mesh image of the simulated structure, (d) a magnified image of a small section of mesh, the corresponding plasmonic excitation states for (e) θ = 78.5◦, (f) θ = 81◦, and (g) θ = 83.5◦ (the angle of resonance), (h) an enlarged view of the plasmonic resonance at 83.5◦. Biosensor Structure utilizing GaN and BP layer over bimetal: (i) a plasmonic excitation at the angle of resonance of θ = 84.7◦, (j) an enlarged view of the plasmonic resonance at 84.7◦. An enlarged view of plasmonic excitation at the resonance angle: (k) θ = 82.7◦, and (l) θ = 84.5◦ for the structure utilizing AlN/BP and Si/BP over the bimetallic layer of Au/Ag, respectively.

ACS Omega
Kargeti et al., (2024) 9(10):11471-11477

Design and Exploration by Quantum Chemical Analysis of Photosensitizers Having [D−π−π−A]- and [D-D-triad-A]-Type Molecular Structure Models for DSSC

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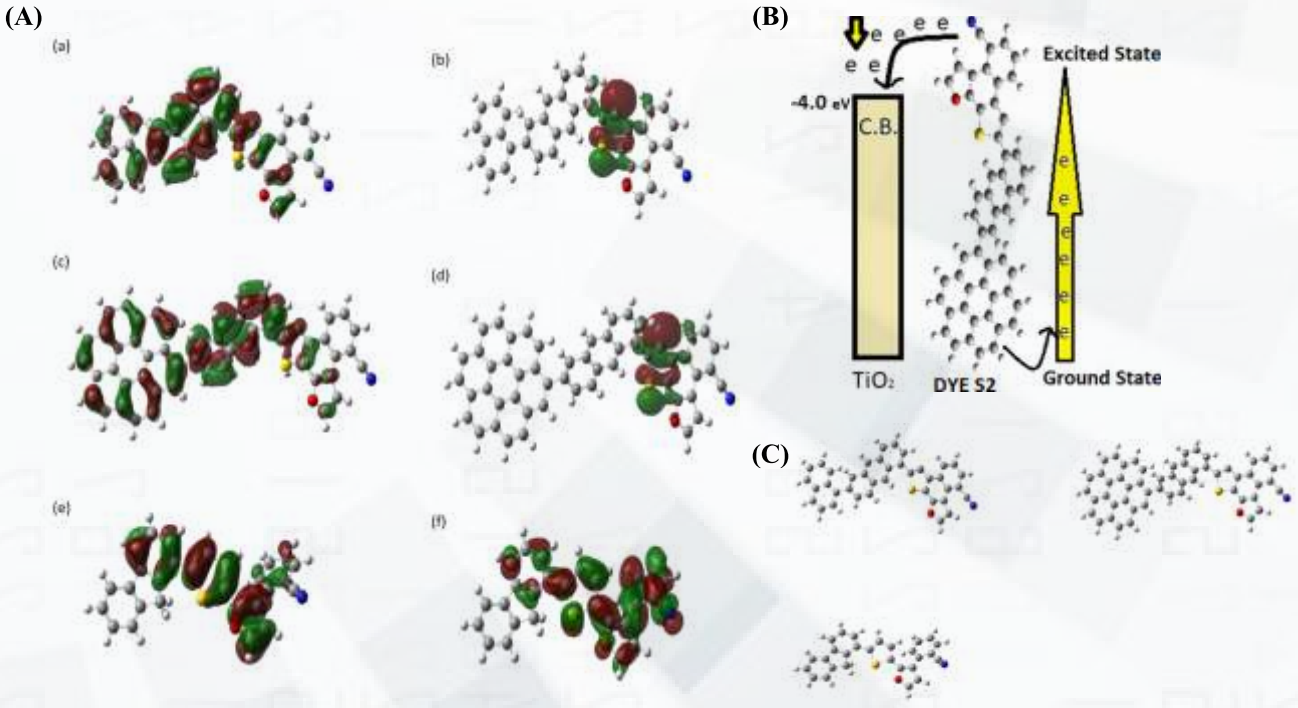
I.F. 3.7

Density functional theory (DFT) calculations are performed on the newly developed and designed photosensitizers having [D-D-triad-A]- and [D-π-π-A]-type structural models for near-infrared absorption dye-sensitized solar cells (DSSCs). For this purpose, three novel molecules are designed, which are named as follows: [naphthalene-anthracene-thiophene-furan-benzonitrile] as dye S1, [coronene-anthracene-thiophene-furan-benzonitrile] as dye S2, and [fluorene-thiophene-furan-benzonitrile] as dye S3. In all three systems, benzonitrile is the acceptor moiety, while thiophene and furan are bridging moieties. Naphthalene and anthracene are donor moieties in S1, whereas coronene and anthracene are donor moieties in S2, and fluorene is the only single donor moiety used for designing the dye complex S3. All three dye complexes are optimized under the DFT framework by using the B3LYP hybrid functional with 6-31G(d,p) basis set on Gaussian 16W software. The absorption spectra are calculated utilizing time-dependent density functional theory (TD-DFT) with the CAM-B3LYP/6-31G(d,p) basis set. The calculated absorption maxima of S1 and S2 are 749.45 and 750.04 nm, respectively, while for S3, it is reported to be at 337.35 nm, which suggests that the designed molecular structure having a double-donor moiety is suitable for high absorption wavelength. Further, the analysis of frontier molecular orbital energy gap suggests that the molecular systems S1, S2, and S3 have values 2.17, 2.13, and 3.618 eV, respectively, which lie in the semiconducting region. The other parameters calculated for the photovoltaic performance are exciton binding energy, change in free energy of charge regeneration, change in free energy of charge injection, oscillator strength, light harvesting efficiency, and open-circuit voltage.



Quantum Chemical Analysis of Photosensitizers

ACS OMEGA
Altaf et al., (2024) 9(7):8557-8573

Trichoderma Inoculation Alleviates Cd and Pb-Induced Toxicity and Improves Growth and Physiology of *Vigna radiata* (L.)

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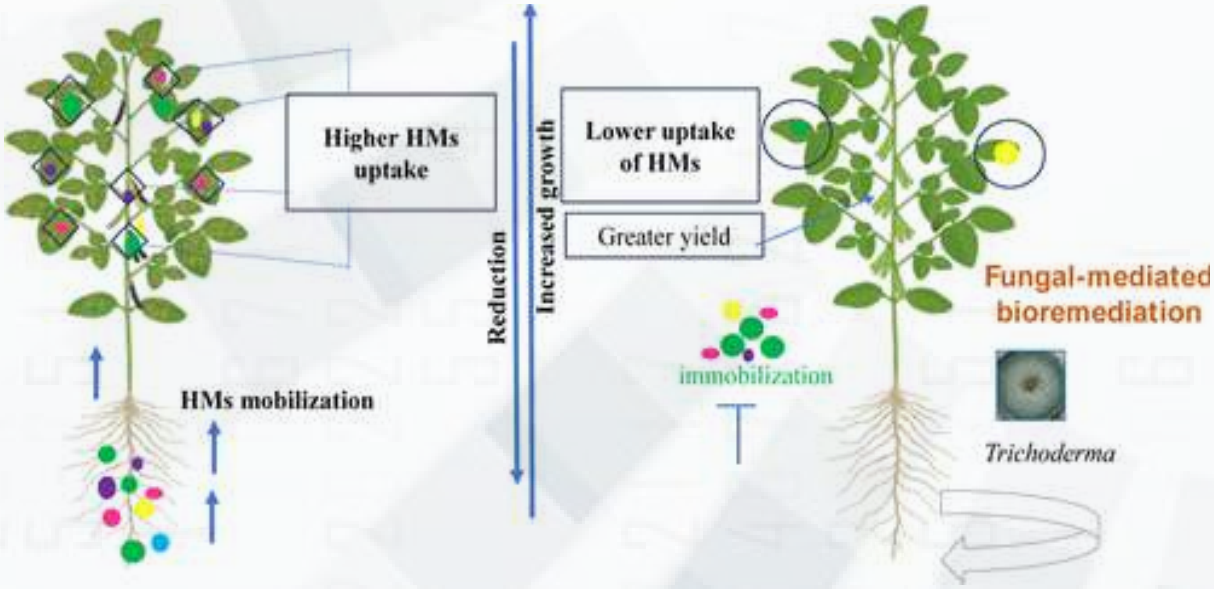
I.F. 3.7

Heavy metals (HMs) pose a serious threat to agricultural productivity. Therefore, there is a need to find sustainable approaches to combat HM stressors in agriculture. In this study, we isolated Trichoderma sp. TF-13 from metal-polluted rhizospheric soil, which has the ability to resist 1600 and 1200 μg mL−1 cadmium (Cd) and lead (Pb), respectively. Owing to its remarkable metal tolerance, this fungal strain was applied for bioremediation of HMs in Vigna radiata (L.). Strain TF-13 produced siderophore, salicylic acid (SA; 43.4 μg mL−1) and 2,3- DHBA (21.0 μg mL−1), indole-3-acetic acid, ammonia, and ACC deaminase under HM stressed conditions. Increasing concentrations of tested HM ions caused severe reduction in overall growth of plants; however, Trichoderma sp. TF-13 inoculation significantly ($p \leq 0.05$) increased the growth and physiological traits of HM-treated V. radiata. Interestingly, Trichoderma sp. TF-13 improved germination rate (10%), root length (26%), root biomass (32%), and vigor index (12%) of V. radiata grown under 25 μg Cd kg−1 soil. Additionally, Trichoderma inoculation showed a significant ($p \leq 0.05$) increase in total chlorophyll, chl a, chl b, carotenoid content, root nitrogen (N), and root phosphorus (P) of 100 μg Cd kg−1 soil-treated plants over uninoculated treatment. Furthermore, enzymatic and nonenzymatic antioxidant activities of Trichoderma inoculated in metal-treated plants were improved. For instance, strain TF-13 increased proline (37%), lipid peroxidation (56%), catalase (35%), peroxidase (42%), superoxide dismutase (27%), and glutathione reductase (39%) activities in 100 μg Pb kg−1 soil-treated plants. The uptake of Pb and Cd in root/shoot tissues was decreased by 34/39 and 47/38% in fungal-inoculated and 25 μg kg−1 soil-treated plants. Thus, this study demonstrates that stabilizing metal mobility in the rhizosphere through Trichoderma inoculation significantly reduced the detrimental effects of Cd and Pb toxicity in V. radiata and also enhanced development under HM stress conditions.



Hyperchaotic image encryption

Journal of Genetic Engineering and Biotechnology
Vaish et al., (2024) 22(1):100345

Meta-analysis of biodynamic (BD) preparations reveal the bacterial population involved in improving soil health, crop yield and quality

Supriya Vaish[a], Sumit K. Soni[b], Balvindra Singh[a], Neelima Garg[a], **Iffat Zareen Ahmad**[c], Muthukumar Manoharan[b], Ajaya Kumar Trivedi[a]

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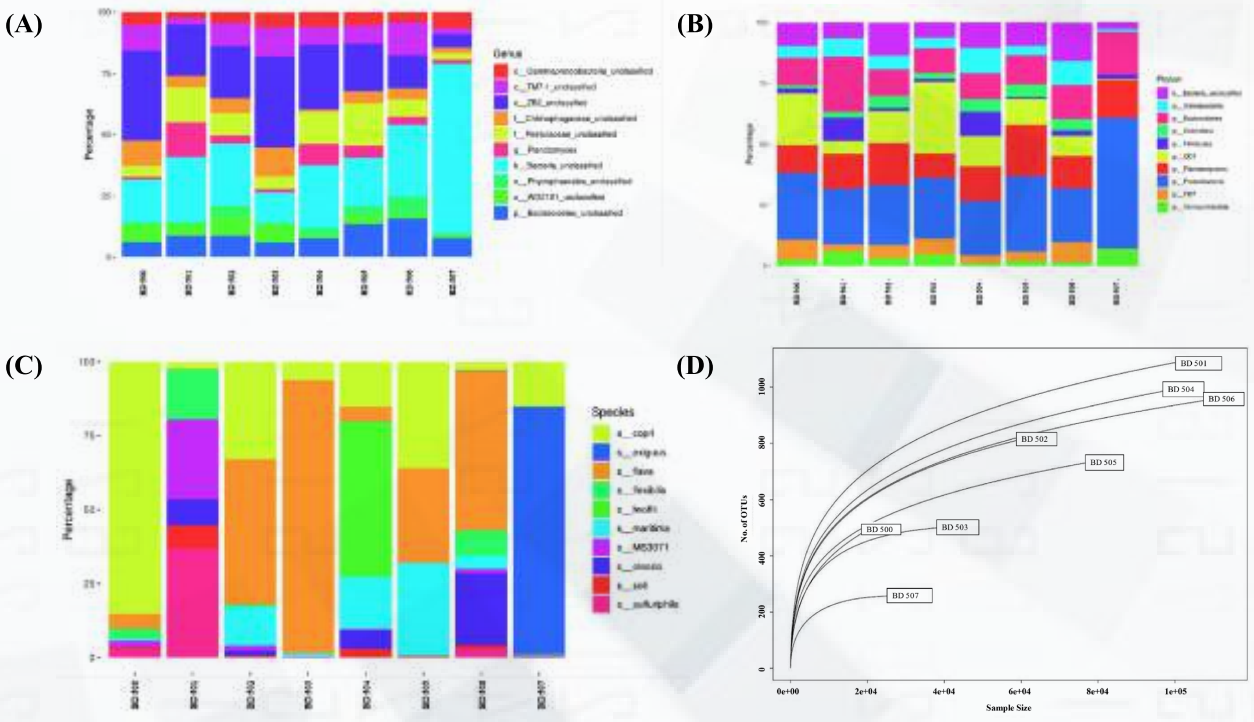
I.F. 3.6

Background : Bacterial community found in biodynamic preparations (BD500-BD507) can help improve soil health, plant development, yield, and quality. The current work describes a metagenomic investigation of these preparations to identify the bacterial communities along with the functional diversity present within them.

Results : Metagenome sequencing was performed using the Illumina MiSeq platform, which employs next-generation sequencing (NGS) technology, to provide an understanding of the bacterial communities and their functional diversity in BD preparations. NGS data of BD preparations revealed that maximum operational taxonomic units (OTUs) of the phylum *Proteobacteria* were present in BD506 (23429) followed by BD505 (22712) and BD501 (21591), respectively. Moreover, unclassified phylum (16657) and genus (16657) were also highest in BD506. Maximum alpha diversity was reported in BD501 (1095 OTU) and minimum in BD507 (257 OTU). Further, the OTUs for five major metabolic functional groups viz carbohydrate metabolism, xenobiotic degradation, membrane transport functions, energy metabolism, and enzyme activities were abundant in BD506 and BD501.

Conclusion : The bacterial communities in BD506 and BD501 are found to be unique and rare; they belong to functional categories that are involved in enzyme activity, membrane transport, xenobiotic degradation, and carbohydrate metabolism. These preparations might therefore be thought to be more effective. The investigation also found a highly varied population of bacteria, which could explain why BD preparations work well in the field. In view of this, the BD preparations may be utilized for unexploited bacterial communities for sustainable agriculture production.



Meta-analysis of biodynamic (BD) preparations using the Illumina MiSeq platform

Journal of Biomaterial Science, Polymer Edition
Shukla et al., (2024) 35(11):1684-1705

Development and efficacy assessment of polyherbal phytosomal gel for accelerated wound healing

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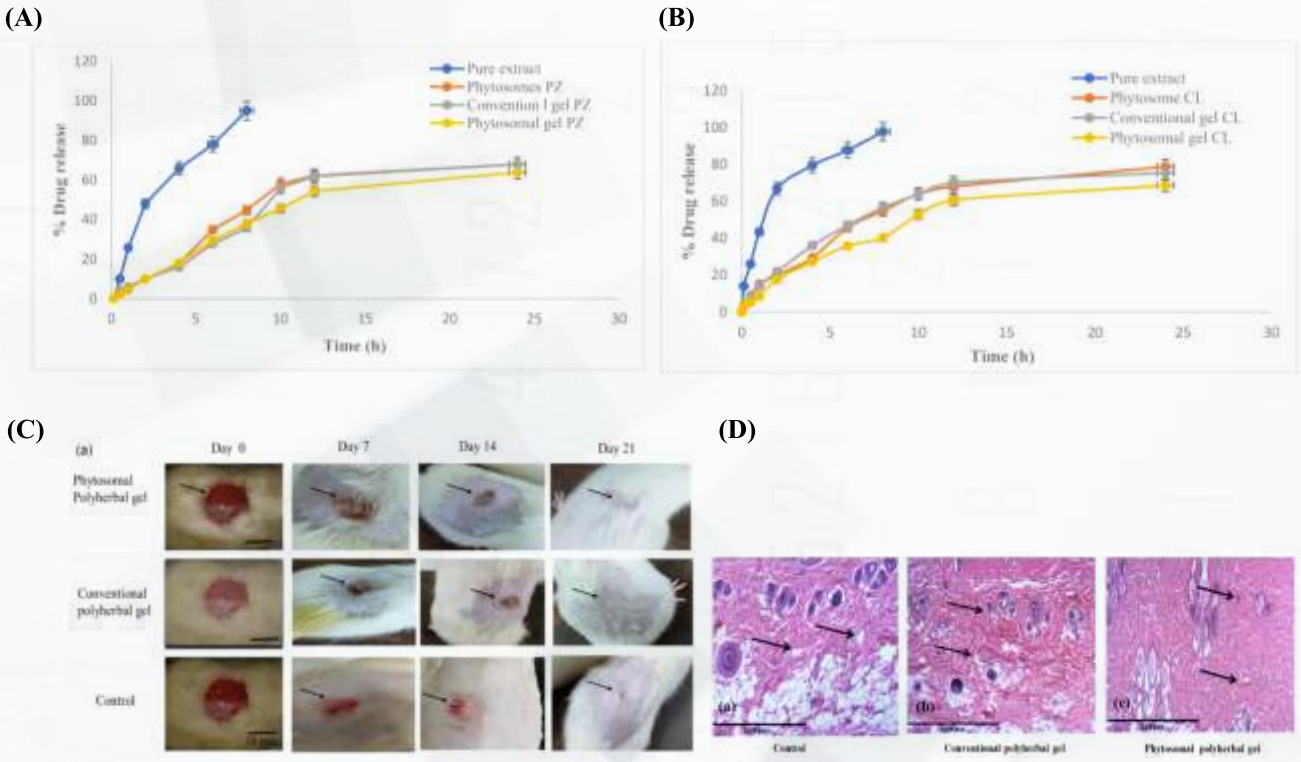
I.F. 3.6

Curcuma longa L. and *Plumbago zeylanica* L. are renowned for their antioxidant, anti-inflammatory, and wound-healing properties, primarily attributed to their polyphenolic compounds. However, the limited water solubility of these compounds poses challenges to their effective utilization. Encapsulation within phytosomes offers a solution by enhancing bioavailability and permeability. This study aimed to formulate a phytosome-based polyherbal gel incorporating methanolic extracts of *P. zeylanica* and *C. longa* to explore its potential in wound healing. Methanolic extracts of *P. zeylanica* roots and *C. longa* rhizomes were encapsulated in phytosomes using the lipid film hydration technique. Various phytosome formulations were developed and characterized for encapsulation efficiency, particle size, polydispersity index and zeta potential. The optimized phytosomal dispersion (F7) was integrated into a carbopol-based hydrogel matrix. *In vitro* release studies demonstrated prolonged release compared to conventional forms. Stability testing confirmed the robustness of the phytosomal gel at 4 °C/60 ± 5% RH. Wound healing activity was assessed using an excision wound model. The phytosomal gel exhibited enhanced wound contraction and reduced epithelization time compared to conventional gel and control groups, signifying its potent wound-healing effect. In conclusion, the polyherbal phytosomal gel, incorporating *P. zeylanica* and *C. longa*, holds promise in promoting wound healing, presenting a novel and effective approach in the realm of topical formulations for wound care.



Development of a polyherbal phytosomal gel for accelerated wound healing

Free Radical Research
Waiz et al., (2023) 57:294-307

Association of circulatory PCSK-9 with biomarkers of redox imbalance and inflammatory cascades in the prognosis of diabetes and associated complications : a pilot study in the Indian population

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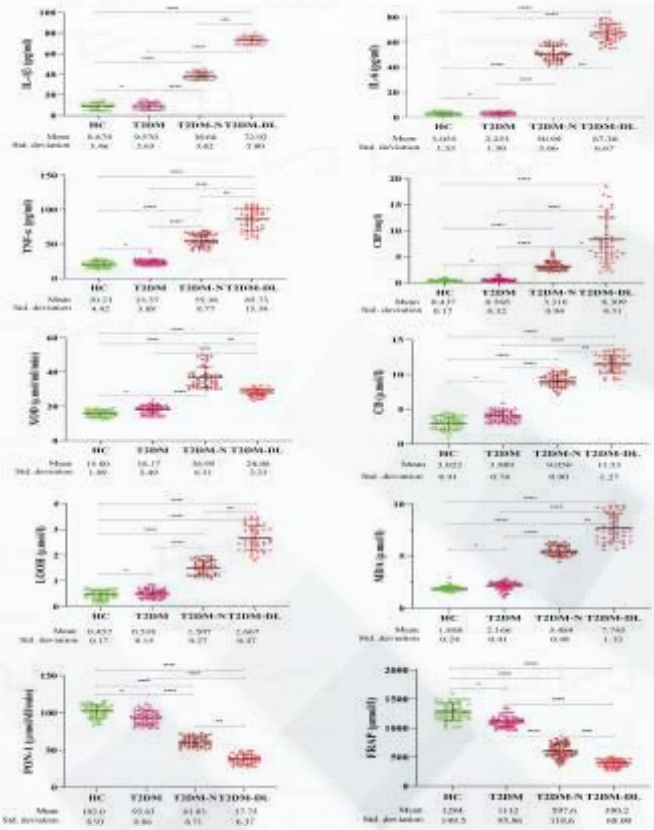
I.F. 3.6

Besides the profound role of proprotein convertase subtilisin/kexin type-9 (PCSK-9) in LDL-C regulation, its association with other metabolic complications cannot be disregarded. The coexistence of redox imbalance and inflammatory cascades has greatly reflected the etiology of hyperglycemia. Therefore, we studied the association of PCSK-9 with inflammation and oxidative stress biomarkers to predict its role in the prognosis of diabetes and its associated complications in the Indian population. This pilot study examined a total of n¼187 subjects: healthy controls (HC; n¼50), diabetic without complication (T2DM; n¼49), diabetic nephropathy (T2DM-N;\ n¼43), and diabetic dyslipidemic (T2DM-DL; n¼45) subjects. The relationship between circulatory PCSK-9 levels and inflammation and redox imbalance biomarkers has been explored. The significant positive association of elevated PCSK-9 level with the inflammatory (i.e. IL-1b, IL-6, TNF-a, and CRP) and oxidative stress marker (i.e. XOD, CD, LOOH, and MDA) was observed in T2DM-N and T2DM-DL subjects. Whereas single regression analysis depicted that PCSK-9 was inversely associated with the FRAP and PON-1 in T2DM-N and T2DM-DL subjects. Furthermore, no significant correlation was detected in both T2DM and HC subjects. We found a significant relationship between these prognostic biomarkers with an elevated level of PCSK-9 in T2DM-N and T2DM-DL subjects. PCSK-9 is a nontraditional biomarker in diabetes that may help identify patients at risk of developing secondary complications of diabetes in the Indian population. However, further large cohort validation studies are needed.



Scatterplot of plasma IL-1b, IL-6, TNF-a, CRP, XOD, CD, LOOH, MDA, PON-1 and FRAP in HC (n.50), T2DM (n.49), T2DM-N (n.43) and T2DM-DL (n.45) groups.

Journal of Cell Communication and Signaling
Farzaneh et al., (2023) 17:531-547

Emerging roles of the long non-coding RNA NEAT1 in gynecologic cancers

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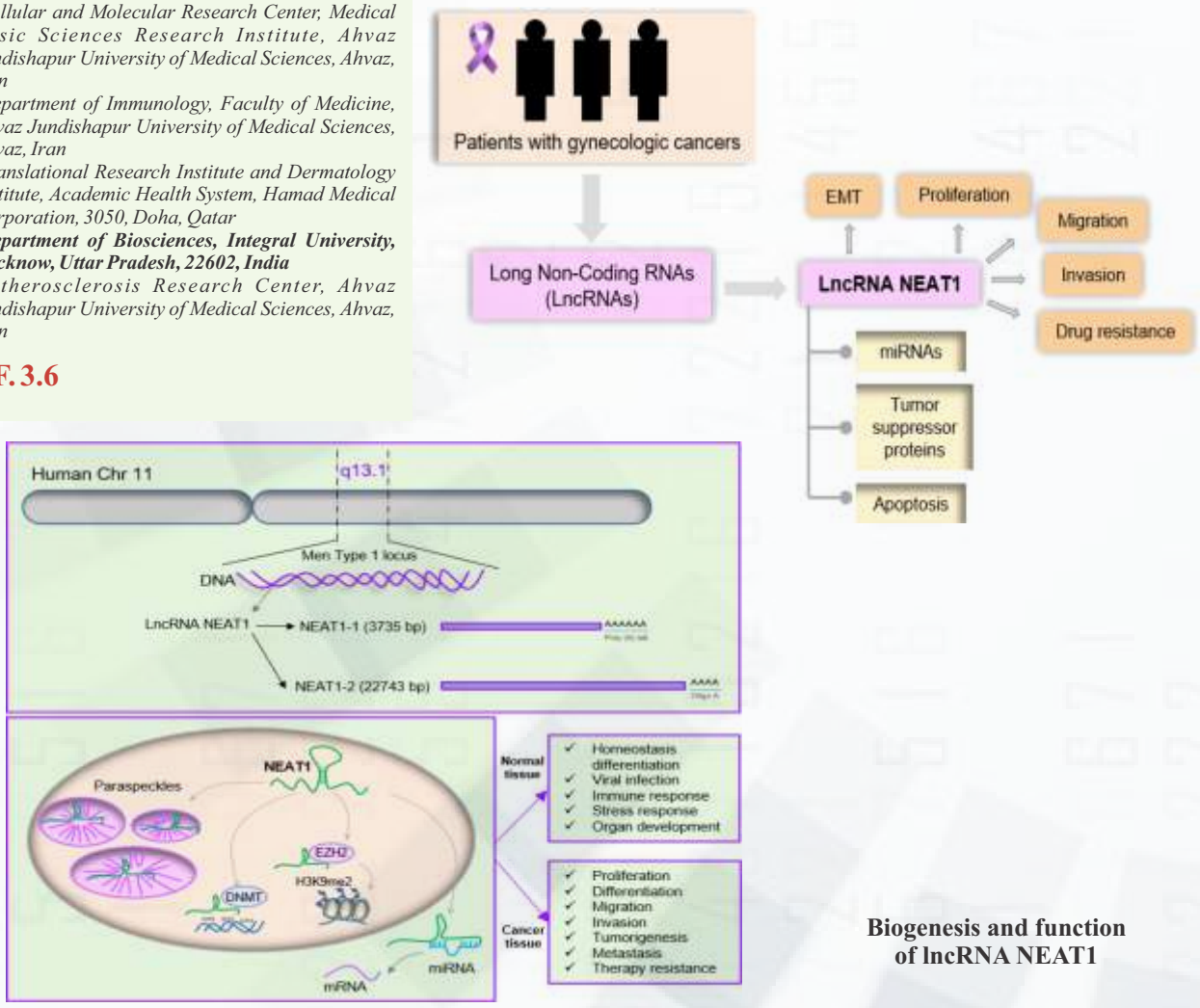
I.F. 3.6

Gynecologic cancers are a worldwide problem among women. Recently, molecular targeted therapy opened up an avenue for cancer diagnosis and treatment. Long non-coding RNAs (lncRNAs) are RNA molecules (> 200 nt) that are not translated into protein, and interact with DNA, RNA, and proteins. LncRNAs were found to play pivotal roles in cancer tumorigenesis and progression. Nuclear paraspeckle assembly transcript 1 (NEAT1) is a lncRNA that mediates cell proliferation, migration, and EMT in gynecologic cancers by targeting several miRNAs/mRNA axes. Therefore, NEAT1 may function as a potent biomarker for the prediction and treatment of breast, ovarian, cervical, and endometrial cancers. In this narrative review, we summarized various NEAT1-related signaling pathways that are critical in gynecologic cancers.



Biogenesis and function of lncRNA NEAT1

International Journal of Geriatric Psychiatry
Rehman et al., (2024) 39(6):e6104

Glymphatic pathway: An emerging perspective in the pathophysiology of neurodegenerative diseases

Muneeb U. Rehman[1] | Nouroz Sehar[2] | Iyman Rasool[3] | Rana M. Aldossari[4] |Amir Bashir Wani[5] | Shahzada Mudasir Rashid[6] | Adil Farooq Wali[7] | Aarif Ali[6] | Azher Arafah[1] | **Andleeb Khan[8]**

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[5]*Division of Biotechnology, Sher-e-Kashmir University of Agricultural Sciences and Technology-Kashmir, Srinagar, Jammu and Kashmir, India*
[6]*Division of Veterinary Biochemistry, Faculty of Veterinary Science and Animal Husbandry, SKUAST-Kashmir, Alusteng, Shuhama, Srinagar, Jammu and Kashmir, India*
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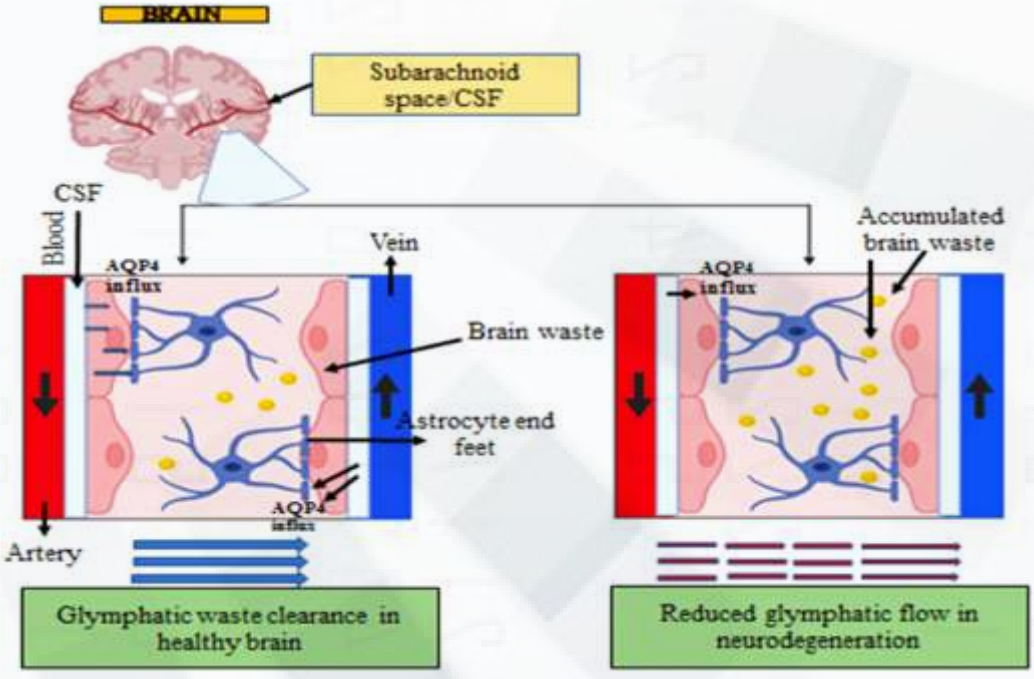
I.F. 3.6

The central nervous system (CNS) is widely recognized as the only organ system without lymphatic capillaries to promote the removal of interstitial metabolic byproducts. Thus, the newly identified glymphatic system which provides a pseudolymphatic activity in the nervous system has been focus of latest research in neurosciences. Also, findings reported that, sleep stimulates the elimination actions of glymphatic system and is linked to normal brain homeostatis. The CNS is cleared of potentially hazardous compounds via the glymphatic system, particularly during sleep. Any age-related alterations in brain functioning and pathophysiology of various neurodegenerative illnesses indicates the disturbance of the brain's glymphatic system. In this context, β-amyloid as well as tau leaves the CNS through the glymphatic system, it's functioning and CSF discharge markedly altered in elderly brains as per many findings. Thus, glymphatic failure may have a potential mechanism which may be therapeutically targetable in several neurodegenerative and age-associated cognitive diseases. Therefore, there is an urge to focus for more research into the connection among glymphatic system and several potential brain related diseases. Here, in our current review paper, we reviewed current research on the glymphatic system's involvement in a number of prevalent neurodegenerative and neuropsychiatric diseases and, we also discussed several therapeutic approaches, diet and life style modifications which might be used to acquire a more thorough performance and purpose of the glymphatic system to decipher novel prospects for clinical applicability for the management of these diseases.



Metabolomics
Rai et al., (2023) 19(11):92

Clinical metabolomics by NMR revealed serum metabolic signatures for differentiating sarcoidosis from tuberculosis

Mohit Kumar Rai[1] · **Sachin Yadav**[1,2] · Avinash Jain[1,6] · kritika Singh[1] · Amit Kumar[3] · Ritu Raj[3] · Durgesh Dubey[1,3]
Harshit Singh[1,7] · Anupam Guleria[3] · Saurabh Chaturvedi[1,5] · Abdul Rahman Khan[2] · Alok Nath[4] · Durga Prasanna Misra[1] · Vikas Agarwal[1] · Dinesh Kumar[3]
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3 Centre of Biomedical Research (CBMR), Lucknow, UP 226014, India

I.F. 3.5

Background : Pulmonary sarcoidosis (SAR) and tuberculosis (TB) are two granulomatous lung-diseases and often pose a diagnostic challenge to a treating physicians.

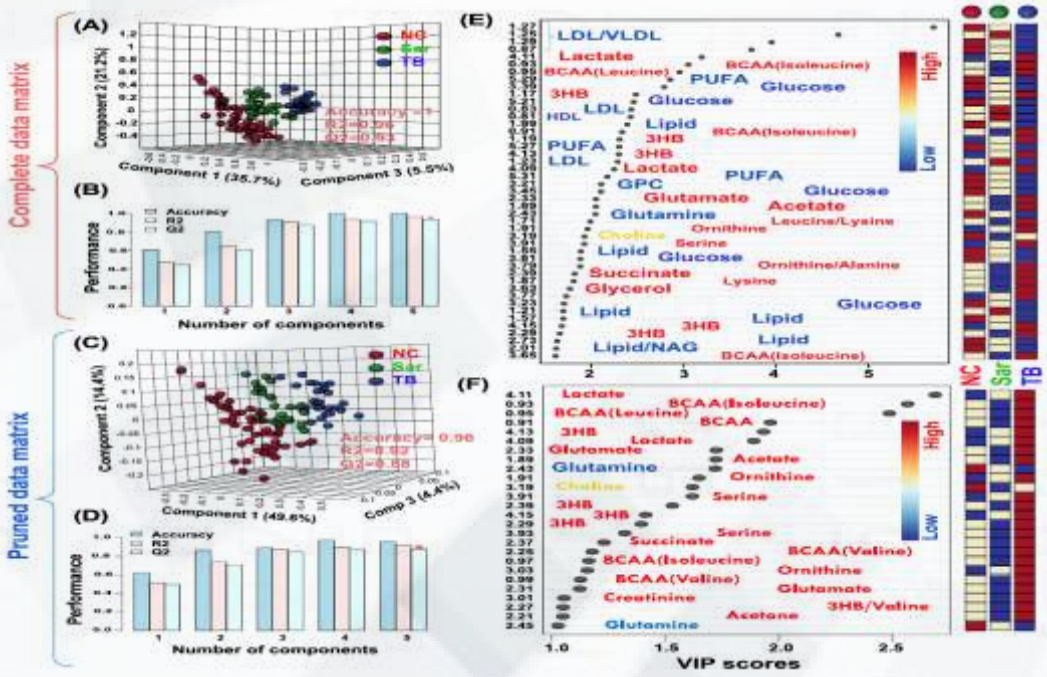
Objective The present study aims to explore the diagnostic potential of NMR based serum metabolomics approach to differentiate

SAR from TB.

Materials and Method : The blood samples were obtained from three study groups: SAR (N = 35), TB (N = 28) and healthy normal subjects (NC, N = 56) and their serum metabolic profiles were measured using 1D 1H CPMG (Carr-Purcell-Meiboom-Gill) NMR spectra recorded at 800 MHz NMR spectrometer. The quantitative metabolic profiles were compared employing a combination of univariate and multivariate statistical analysis methods and evaluated for their diagnostic potential using receiver operating characteristic (ROC) curve analysis.

Results : Compared to SAR, the sera of TB patients were characterized by (a) elevated levels of lactate, acetate, 3-hydroxybutyrate (3HB), glutamate and succinate (b) decreased levels of glucose, citrate, pyruvate, glutamine, and several lipid and membrane metabolites (such as very-low/low density lipoproteins (VLDL/LDL), polyunsaturated fatty acids, etc.).

Conclusion : The metabolic disturbances not only found to be well in concordance with various previous reports, these further demonstrated very high sensitivity and specificity to distinguish SAR from TB patients suggesting serum metabolomics analysis can serve as surrogate method in the diagnosis and clinical management of SAR.



Multivariate statistical analysis based on PLS-DA model constructed using both the complete as well as the pruned CPMG data matrix:A, C 3D score plots, B, D the performance of the models and E, F the corresponding VIP score-plots

Biomass Conversion and Biorefinery
Bhat et al., (2023) DOI:10.1007/s13399-023-05195-5

Optimizing crystallinity and particle size of cellulose nanocrystals from rice straw biomass: an integrated sonication-assisted acid hydrolysis approach

Mohd Ishfaq Bhat[1], N C Shahi[1], U C Lohani[1], Anil Kumar[2], Shikhangi Singh[1], **Gazia Nasir**[3], Junaid Aman[4]

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[2]*Department of Food Science and Technology, GBPUAT, Pantnagar, Uttarakhand, India*
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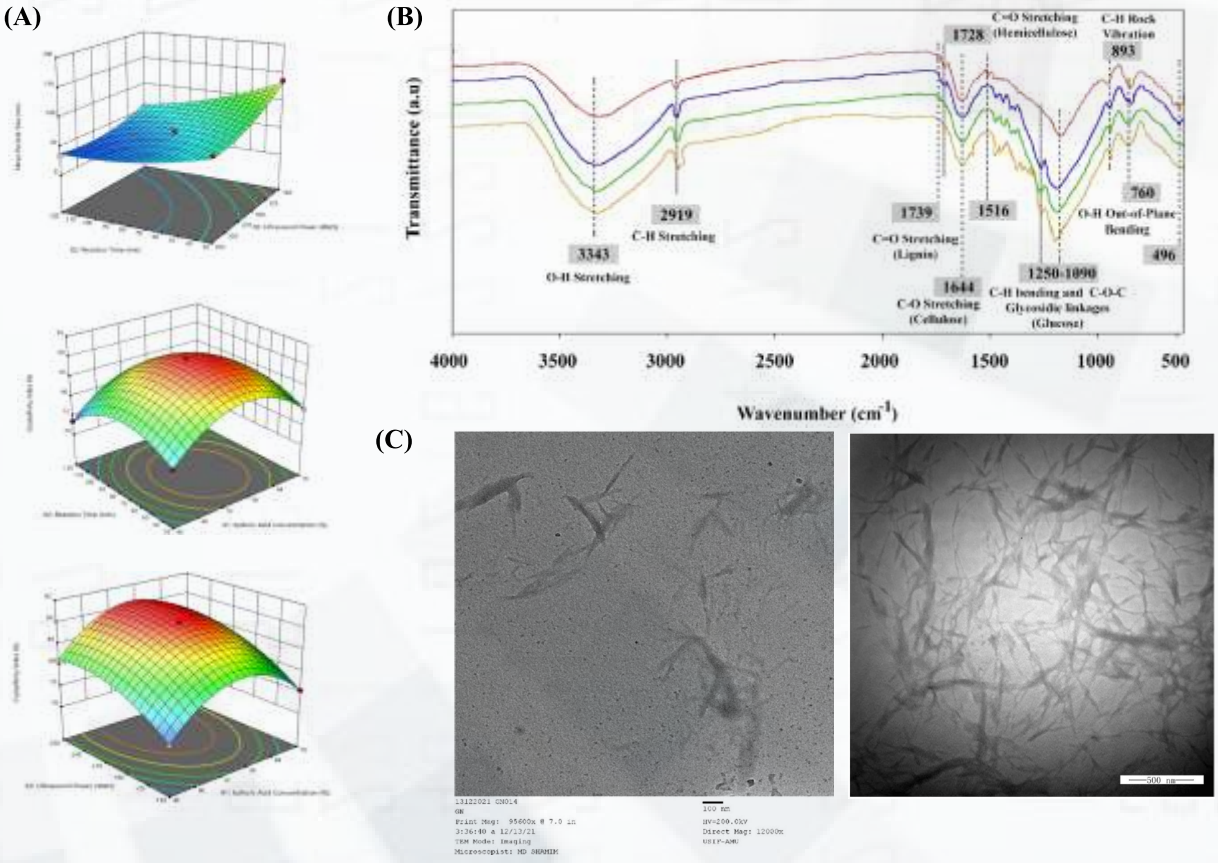
[4]*School of Applied and Life Sciences, Uttaranchal University, Dehradun, Uttarakhand, India*

I.F. 3.5

This study focuses on producing cellulose nanocrystals (CNCs) derived from rice straw cellulose. It employs an integrated hydrolysis and ultrasonication approach to achieve an optimized balance between two crucial parameters, the crystallinity index (CI) and mean particle size (MPS), both vital for enhancing biopolymer reinforcement. The research investigates the effects of three key process parameters: sulfuric acid concentration (40 to 70%), ultrasound power (150 to 250 W), and ultrasound treatment time (30 to 120 min) using a Box-Behnken experimental design. The analysis reveals that both the crystallinity index and mean particle size data conform to a quadratic model with high coefficients of determination (R2 = 0.993 and 0.9922, respectively). The optimal conditions were identified through response surface optimization: sulfuric acid concentration of 51.62%, ultrasound treatment time of 48.55 min, and ultrasound power of 238.80 W. Under these conditions, CNC with a mean particle size of 65.87 nm and a crystallinity index of 90.01% were successfully obtained, resulting in a yield of 52.2% for optimized CNC. The ultrasonic cavitation process enhances crystallinity, leading to a pronounced peak sharpening in the nanocellulose spectra fingerprint region (893–1500 cm−1). Furthermore, the cellulose nanocrystals exhibit a rod-shaped structure with an average length of 190 ± 6 nm and width of 35 ± 3 nm.



Cellulose nanocrystals from rice straw biomass

Biomass Conversion and Biorefinery
Thomas et al., (2023) DOI:10.1007/s13399-023-04815-4

Laccase production from Bacillus sp. BAB-4151 using artificial neural network and genetic algorithm and its application for wastewater treatment

Deepa Thomas[1], Ajit K. Gangawane[1], R. Z. Sayyed[2,3], Rabi'atul Adawiyah Ahmad[3], Saif Khan[4], Mahvish Khan[5], Vineeta Singh[6], **Khwaja Osama**[7] *et. al.*

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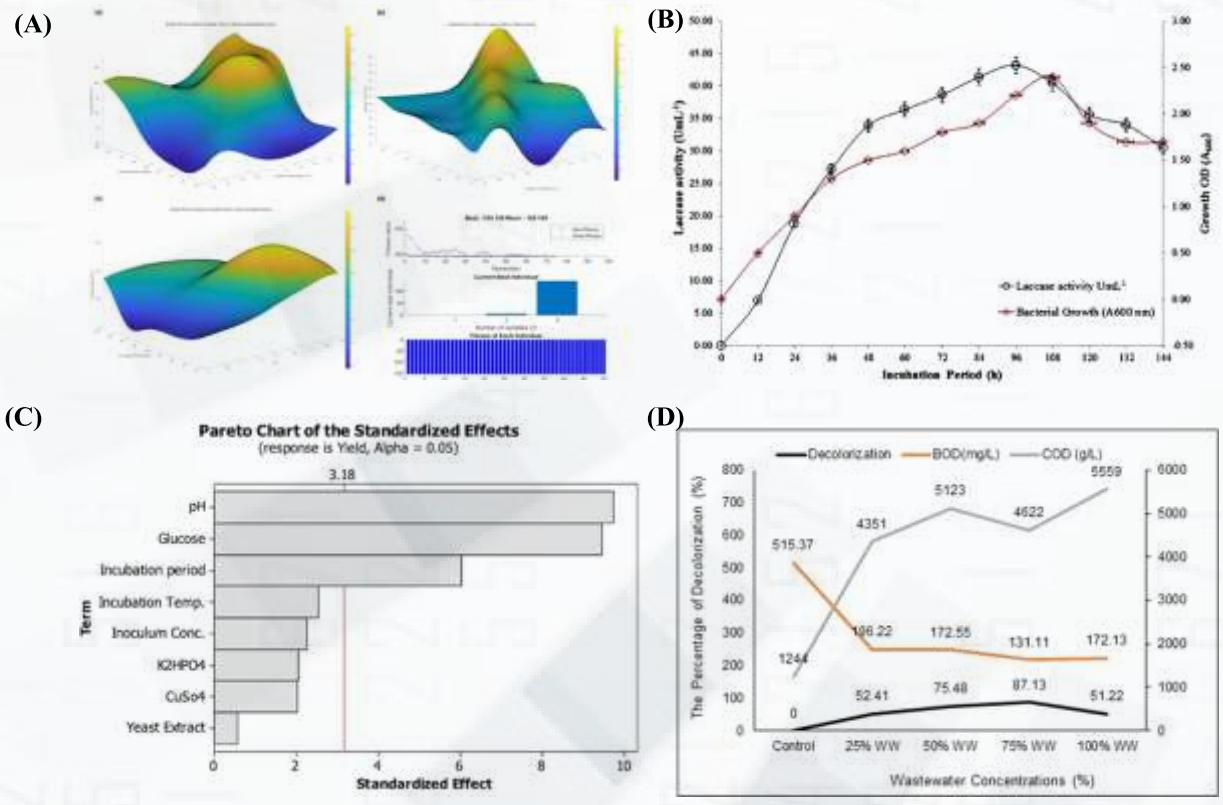
I.F. 3.5

Dye-based pollutants are frequently discharged into water bodies, negatively impacting human and environmental health. The treatment of waste-water using laccase-producing microbes generates non-toxic compounds. Higher yields of laccase at the industrial level require a potential laccase-producing bacteria and optimization of production parameters. The present study aimed to maximize the laccase yield of *Bacillus* sp. BAB-4151, using artificial neural network (ANN) coupled with a genetic algorithm (GA) approach. Of the six laccase-producing bacteria, *Bacillus* sp. BAB-4151 produced copious amounts of laccase (150 .5 UmL-1). A further improvement in laccase yield (~35%) was obtained through ANN-GA. The laccase-rich broth was applied to wastewater treatment using a completely randomized design (CRD) using five treatments consisting of control (uninoculated), and wastewater concentrations (25%, 50%, 75%, and 100%) and the dye decolorization potential of *Bacillus* sp. BAB-4151 was determined based on changes in pH, Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) values. T3 treatment resulted in the maximum decolorization (80.13%), yielding minimum BOD (153.21 mg/L), and COD (6.53 mg/L). Thus, the laccase yield of *Bacillus* sp. BAB-4151 can be improved using the ANN-GA approach laccase rich broth and can be employed to mitigate dye-rich wastewater of the textile industries.



Laccase production from *Bacillus* sp. BAB-4151

Current Medicinal Chemistry
Akhtar et al., (2024) 31(5):552-553

Novel and Latest Computational Routes in the Design and Development of Anticancer Drugs

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I.F. 3.5

Despite the discernible advancements achieved in science and technology during recent decades and the extensive research endeavours directed towards the oncology domain, the formulation of a definitive and allencompassing strategy for cancer treatment, culminating in a decisive curative approach, continues to pose a lingering challenge. The endeavour to surmount this challenge has been characterised by adopting diverse interdisciplinary methodologies, from meticulous biochemical explorations to transformative biotechnological innovations, notably nanotechnology. Against the backdrop of this intricate scenario, computational methodologies and bioinformatics have surfaced as pivotal constituents in addressing the deficiencies and constraints inherent in prevailing technologies. Within this framework, computational strategies have surpassed traditional confines, affording several notable benefits, including cost efficiency and concurrently managing extensive datasets. Beyond streamlining accessibility, these computational paradigms have also engendered remarkable virtual platforms that facilitate the intricate processes of modeling, designing, and analyzing data pertinent to anticancer research. In this context, we are excited to introduce a special issue that delves deeply into the theme of "Novel and Latest Computational Routes in the Design and Development of Anticancer Drugs". This collection of articles is a testament to the profound impact of computational techniques on reshaping the landscape of cancer therapeutics. This special issue not only celebrates the progress made in the realm of cancer research but also underscores the evolving paradigm in drug discovery, where computational tools have become integral components in the intricate process of designing novel anticancer agents.

Biomass Conversion and Biorefinery
Jahan et al., (2023) 13:16241-16251

Boosting protein yield from mustard (Brassica juncea) meal via microwave-assisted extraction and advanced optimization methods

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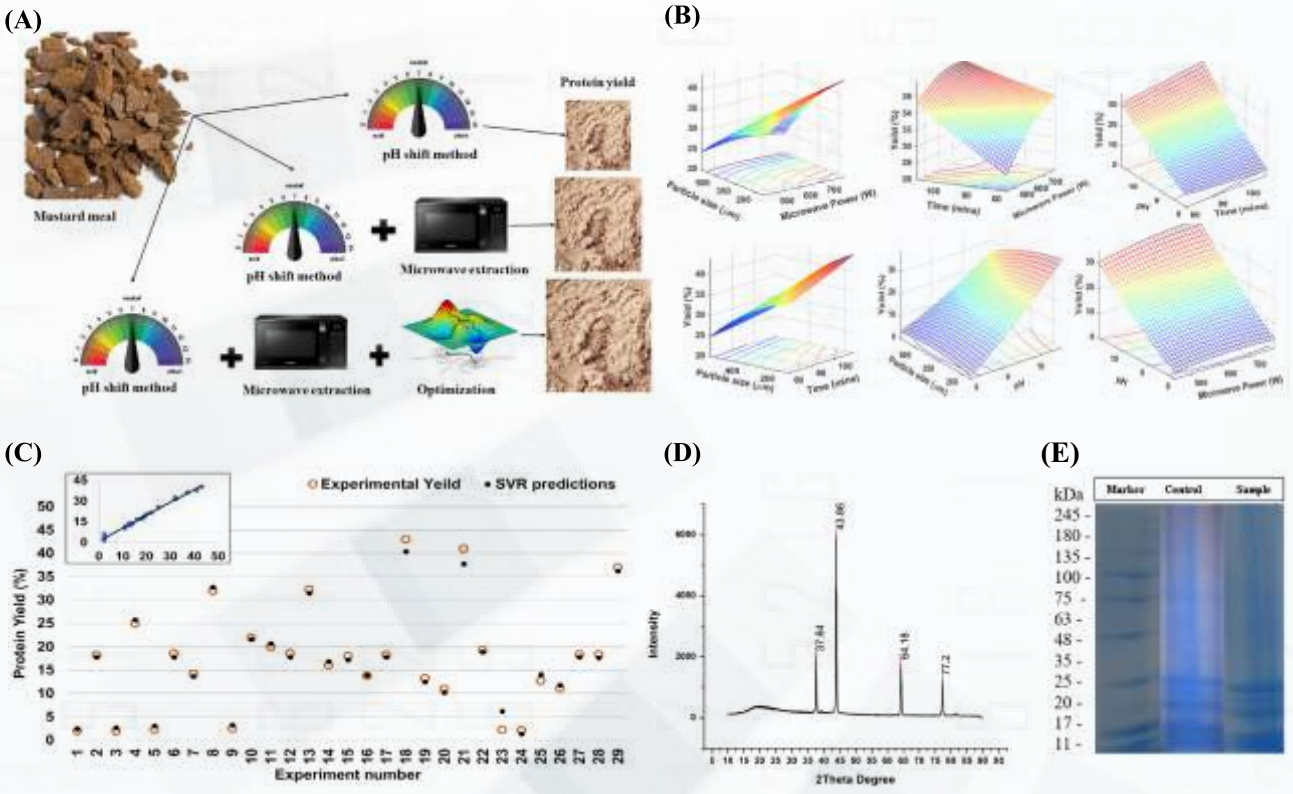
[3]*Department of Food Technology, Islamic University of Science & Technology, Awantipora, JK 192122, India*

I.F. 3.5

In this study, we used microwave-assisted extraction to extract mustard protein isolates from defatted mustard meal, highlighting the importance of mustard as a versatile crop and the value addition potential of mustard protein isolates. We examined the effects of microwave power (425, 625, 800 W), treatment time (60, 90, 120 s), pH (8, 9.5, 11), and particle size (150, 375, 600 µm). A support vector regression–based model was developed and combined with a genetic algorithm for optimization. The maximum yield of 46.73% was achieved at microwave power 800 W, treatment time 120 s, pH 11, and particle size 150 µm. The functional properties of the protein isolates obtained under optimized conditions were analyzed. The protein isolates exhibited water absorption capacity of 2.48 g/g, oil absorption capacity of 0.66 g/g, emulsifying stability of 57.89%, foaming capacity of 83%, and stability of 91.6%. Microwave treatment did not affect the protein bands observed in SDS-PAGE analysis. The extracted protein showed a semi-crystalline and semi-amorphous nature, with a crystallinity index of 51.891%.



Cellulose nanocrystals from rice straw biomass

Biocatalysis and Agricultural Biotechnology
Amir et al., (2024) 57:103097

Polyhydroxybutyrate (PHB) bioplastic characterization from the isolate Pseudomonas stutzeri PSB1 synthesized using potato peel feedstock to combat solid waste management

Mohammad Amir[a], Shareen Fatima Rizvi[a], Mohd Asif[b], Akil Ahmad[c], Mohammed B. Alshammari[c], Anamika Gupta[d], Mohd Rehan Zaheer[c], Roohi Roohi[a]

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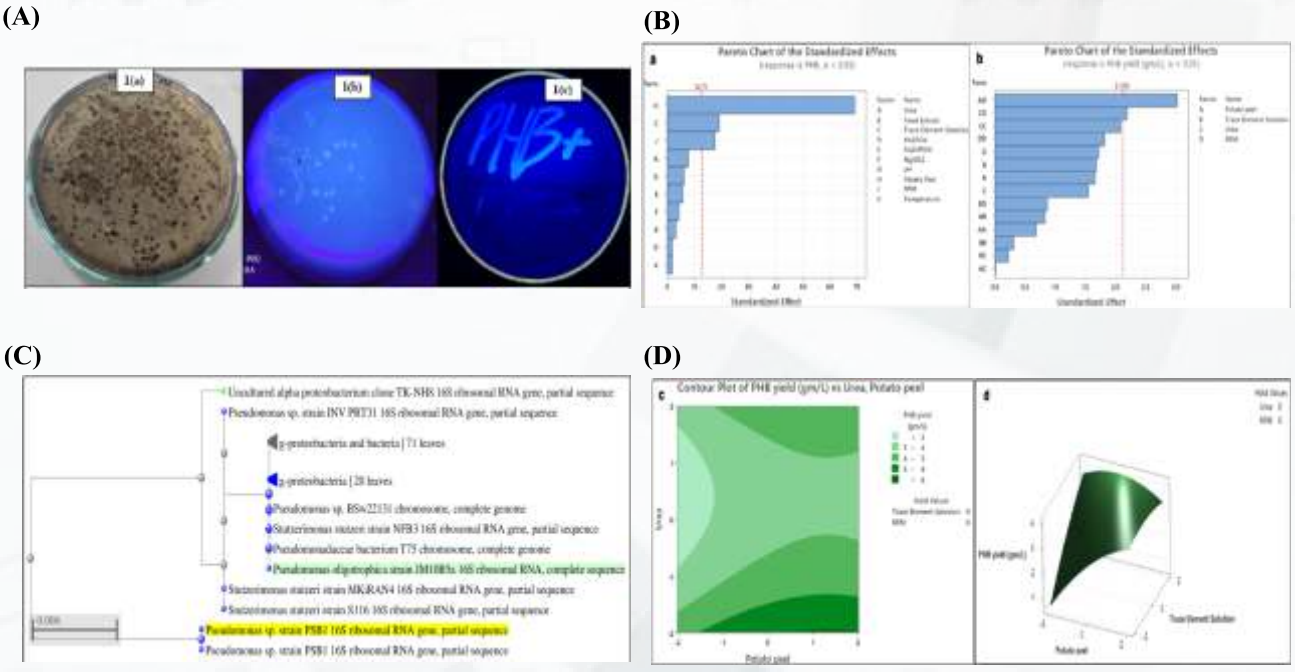
[d]Department of Chemistry, Aligarh Muslim University, Aligarh, U.P., 202002, India
[e]Department of Chemistry, R.M.P.S.P. Girls Post Graduate College, Basti, U.P., 272301, India

I.F. 3.4

The global fossil-based plastic industry is at a crucial point, requiring bio-based polymers. Polyhydroxybutyrate (PHB) is formed under nutritional stress conditions; however, efficient bacteria and cheap substrates are needed. This study found that potato peel, a cheap and abundant carbon source, can improve PHB production. PHB crotonic assay screened 11 Sudan Black B and Nile red positive isolates for PHB production. PSB1, a *Pseudomonas stutzeri* PSB1 (MN539619) yields 2.39 g/L maximal PHB. PHB generation from high-carbon agro-wastes using *Pseudomonas stutzeri* PSB1was 3.09 g/L for potato peel. Plackett-Burman and CCD, a statistical optimization method, increased PHB production. After optimizing all CCD variables, potato peel, Urea, and RPM were found to increase PHB production (6.1 g/L). The optimized parameters extracted 3.98 g/L of PHB from 6.36 g/L of dry biomass of *Pseudomonas stutzeri* PSB1. FT-IR, NMR, TGA, and DSC were used to characterize and compare the extracted PHB biopolymer to Sigma Aldrich PHB powder. Extracted PHB-bioplastic was tested for tensile strength and Elongation at break. Based on the above criteria, the recovered PHB biopolymer from *Pseudomonas stutzeri* PSB1 is a good alternative to agricultural mulch films and non-biodegradable plastics.



Polyhydroxybutyrate (PHB) bioplastic production by *Pseudomonas stutzeri* PSB1

Heliyon
Singh et al., (2023) 9(12):e22438

Ultrasound-assisted extraction of phytochemicals from green coconut shell: Optimization by integrated artificial neural network and particle swarm technique

Poornima Singh[a], **Vinay Kumar Pandey** [a,b], Sourav Chakraborty[c], Kshirod Kumar Dash[c], **Rahul Singh**[a], Ayaz Mukarram shaikh[d], Kovács Béla[d]

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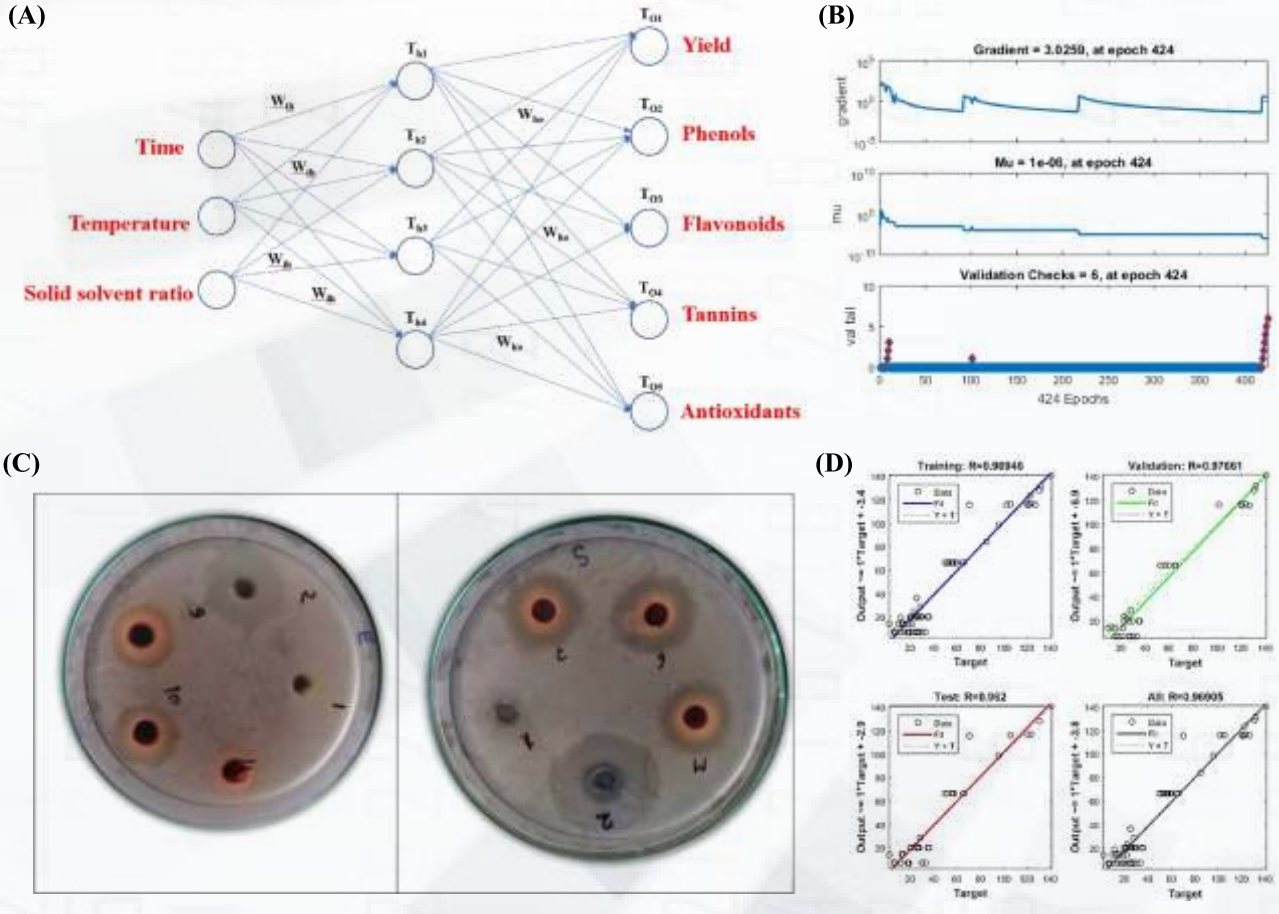
I.F. 3.4

This study employs artificial neural network (ANN) and particle swarm optimization (PSO) to maximize antioxidant and antimicrobial activity from green coconut shells. Phytochemical analysis was carried out on the extract obtained from ultrasound-assisted extraction performed at different combinations of time (10, 20, and 30 min), temperature (30, 35, and 40), and the ratio of solid-solvent (1:10, 1:20, and 1:30 g/ml). The presence of these bioactive compounds exhibits antimicrobial and antioxidant activities. Quantitative analysis showed that the total phenolic compounds ranged from 7.08 to 33.46 mg GAE/g, flavonoids ranged from 2.09 to 28.46 mg QE/g, tannins ranged from 70.5 to 141.09 mg TAE/g, and antioxidant activity of 49.98–66.1%. The FTIR analysis detected the presence of C double bond O, O–H, and C–H bonds. The optimized condition of ultrasound-assisted extraction (UAE) was compared with the optimized condition of the microwave. The result of ultrasound-assisted extraction was observed to be better than microwave-assisted extraction.



Ultrasound-assisted extraction of phytochemicals from green coconut shell

Heliyon
Aafreen et al., (2023) 9(9):e19336

Clinimetric properties of a smartphone application to measure the craniovertebral angle in different age groups and positions

Aafreen[a], **Ashfaque Khan**[a], **Ausaf Ahmad**[b], **Abdur Raheem Khan**[a], **Neeraj Maurya**[a], Mohammed M. Alameer[c], Ahmad H. Hakamy[d], Mohammed A. Hakami[e], Yousef M. Alshehre[f] et al.

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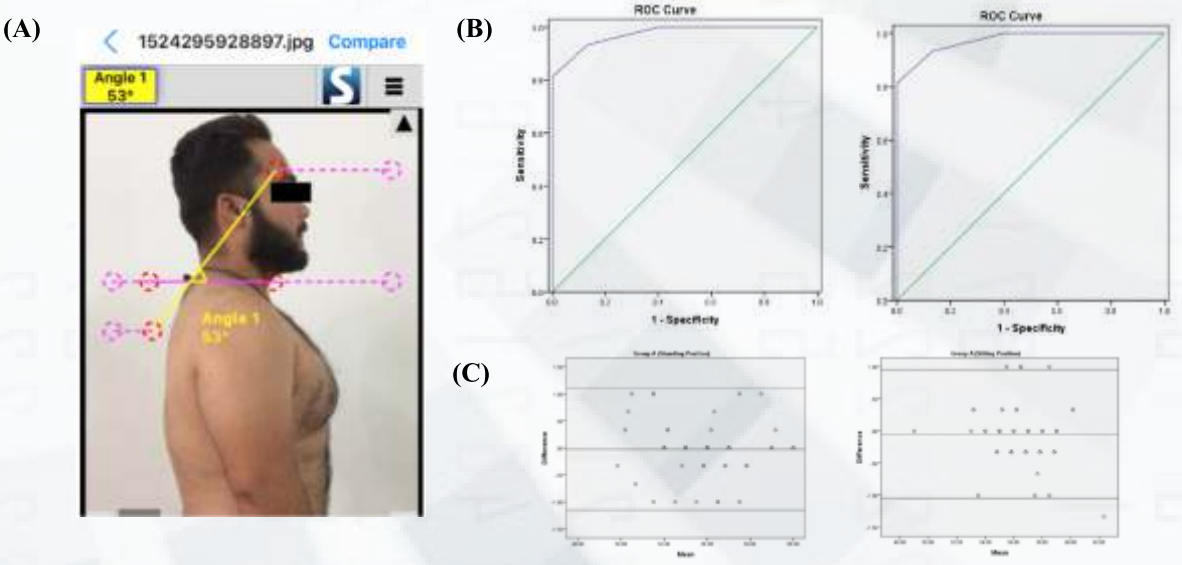
I.F. 3.4

Background : Craniovertebral angle (CVA) alteration is a causative factor for the neck, shoulder, and temporomandibular joints disorders. Therefore, as an outcome measure for therapeutic intervention, measuring the craniovertebral angle with the Surgimap smartphone app is a cost-effective, easily accessible, and reliable tool. This study's objective was to assess the clinimetric properties of the Surgimap smartphone application with Surgimap system software to measure the Craniovertebral Angle in different age groups and positions.

Method : Ninety subjects with neck pain were randomly allocated to aged between 18 and 30 years (Group A; n = 45) and 45–60 years (Group B; n = 45). Using the Surgimap smartphone application and Surgimap system software, the craniovertebral angle was measured objectively in the sagittal plane. Intraclass correlation coefficients were used to determine validity and reliability. Receiver operating characteristic (ROC) curves and the area under the curves (AUC) were determined to distinguish participants with and without forward head posture.

Result : The result of this study shows that Smartphone Surgimap Application and Surgimap System Software correlate 0.95 and have p-values of 0.01 for diverse positions and ages. CVA measurement in the sitting position was significantly lower than in the standing position, regardless of methodology or age. Both positions demonstrated high intra-rater reliability, as evidenced by Intraclass Correlation Coefficients (ICC) between 0.972 and 0.991. The minimum detectable change (MDC) values ranged from 1.3 to 1.733, indicating high measurement accuracy. The smartphone application demonstrated outstanding diagnostic sensitivity (100.00% for Group A standing) and specificity (93.55% for Group B standing).

Conclusion : The Surgimap smartphone application is a reliable and accurate method for craniovertebral angle measurement and is useful for measuring outcomes. Also standing posture was found to be better than sitting posture while measuring the CVA.



Clinimetric properties of the Surgimap smartphone application

Biocatalysis and Agricultural Biotechnology
Rameez et al., (2024) 57:103115

Bionanocomposites: A new approach for fungal disease management

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I.F. 3.4

Fungal diseases pose a significant threat to agriculture, human well-being, and the environment. Conventional approaches to fungal disease management, such as chemical fungicides, have limitations including environmental concerns and the development of resistant strains. Recently, nanotechnology has emerged as a promising alternative for controlling fungal infections. This review discusses the innovative use of bionanocomposites as a novel approach for fungal disease management. Nanocomposites are engineered materials consisting of nanoparticles dispersed within a matrix. They offer unique properties, including enhanced surface area and controlled release, making them ideal candidates for delivering antifungal agents effectively. This paper reviews the latest research on nanocomposites tailored for fungal disease management, highlighting their synthesis methods, characterization techniques, and potential applications across various
domains. The benefits of using nanocomposites in fungal disease management are manifold. They enable targeted delivery of antifungal agents, reducing environmental contamination and minimizing adverse effects on non-target organisms. Additionally, the controlled release kinetics of nanocomposites can enhance the efficacy of antifungal agents while reducing the risk of resistance development. Furthermore, their versatility allows customization for specific fungal pathogens, making them suitable for a wide range of applications in agriculture, medicine, and environmental protection. This review underscores the growing importance of nanocomposites as a transformative technology in the fight against fungal diseases. As research in this field advances, nanocomposites hold great promise for revolutionizing fungal disease management practices, offering sustainable and effective solutions for the future.

Bionanocomposite (BNC) formation and its application on fungal pathogen infected plant.

Multifunctional role of Bionanocomposite (BNC) as a biosensor for plant disease detection, a protectant/therapeutant for plant defense, and a carrier for delivering DNA molecules to confer resistance against specific diseases.

IEEE Access
Khan et al., (2024) 12:86271-86292

Mobility Management in Heterogeneous Network of Vehicular Communication With 5G: Current Status and Future Perspectives

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[4]*Department of ME, University Polytechnic, Integral University, Lucknow 226021, India*
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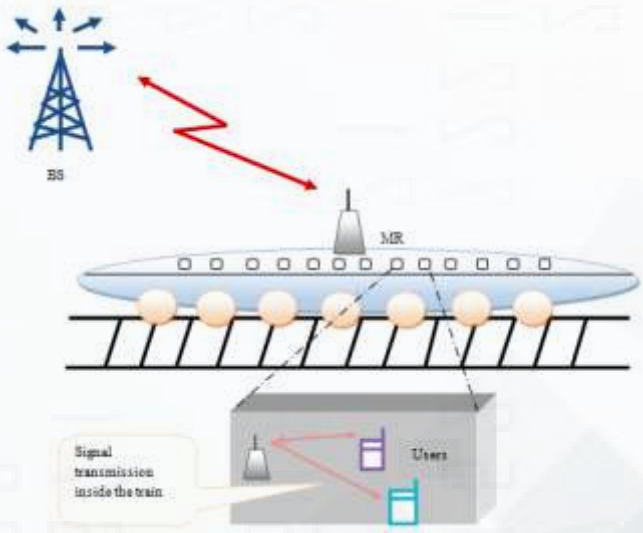
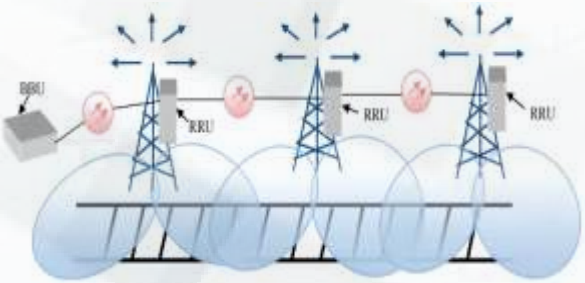
I.F. 3.4

The quality of service (QoS) in public transportation is not at an acceptable level in high-mobility scenarios as penetration loss severely degrades signal quality and reduces the achievable data rate. Also, high mobility requirement is included in 5G as an essential part of its design. In this paper, a background of mobility management in high-speed scenarios and a review of underlay mobility management are presented. After a discussion of the usual high mobility challenges, major techniques for dealing with mobility management are reviewed, including architectural support, handover optimization, and employing new techniques like non-orthogonal multiple access (NOMA), and energy efficiency maximization. Also, challenges and prospective research directions for each technique are provided. The primary objective of this research study is to enhance knowledge of mobility management in high-speed vehicular scenarios, specifically by employing network architectural support in an upcoming heterogeneous mobile network. The primary objective of this research study is to enhance knowledge of mobility management in high-speed vehicular scenarios, specifically by employing network architectural support in an upcoming heterogeneous mobile network.



Two hop Architecture for HSR.



C-RAN Architecture for HSR.

IEEE Access
Rizvi et al., (2023) 11:107703-107724

Classifying Parkinson's Disease Using Resting State Electroencephalogram Signals and UEN-PDNet

Syed Qasim Afser Rizvi[1], Guojun Wang[1], **Asif Khan**[2], Mohammad Kamrul Hasan[3], Taher M. Ghazal[3,5,6], Atta Ur Rehman Khan[4]

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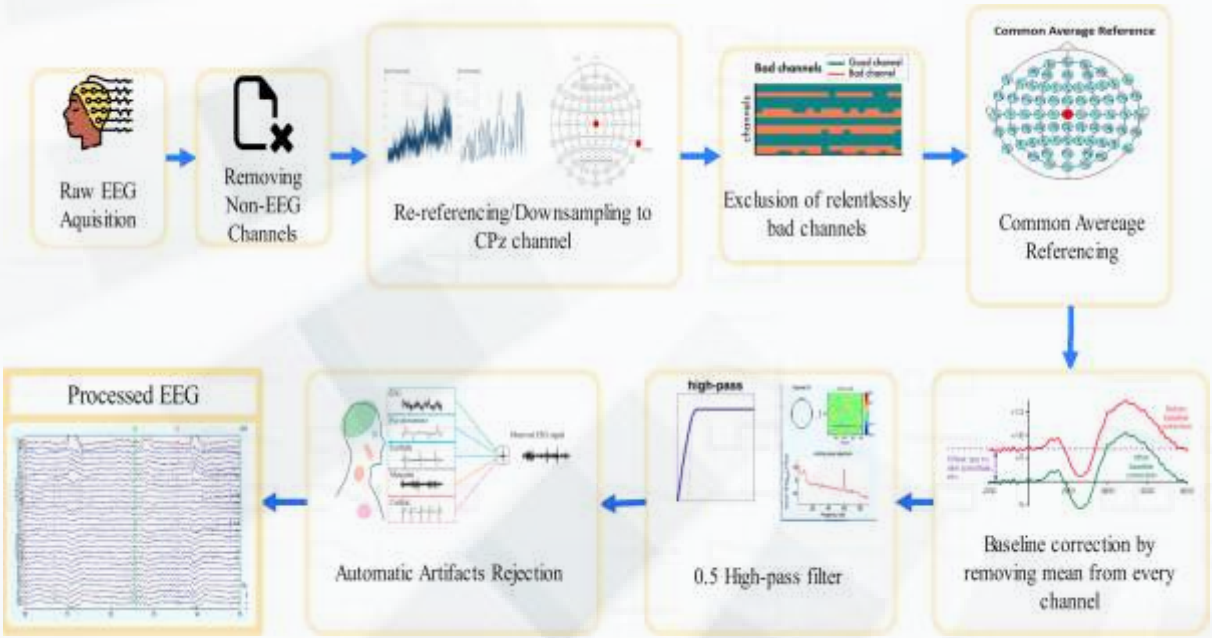
I.F. 3.4

Parkinson's Disease (PD) in the set of neuro-degenerative disorders stimulates due to the loss of dopaminergic neurons from the substantia nigra. Electroencephalogram (EEG) signals are being extensively utilized for diagnosing PD. The existing approaches extract the features using various frequency transformations that lose valuable signal information. An optimized Deep Convolutional Neural Network (CNN) inspired by the encoder part of U-Net architecture is proposed for classifying PD incorporating the resting electroencephalogram (EEG) signal dataset. The proposed model follows the U-Net architecture for extracting the features from the signals. The EEG recordings are taken from two datasets: the University of Mexico (UNM) EEGs and the University of California San Diego (UCSD) resting state dataset. The EEGs are pre-processed with a basic pre-processing pipeline, then separated into single channels, plotting each channel as a simple graph. These graphs are then fed to the proposed 23-layered convolutional neural network (CNN) for classifying PD from the normal control. Consequently, the model achieved maximum values of 93.10%, 93.18%, 93.09%, and 0.9313 of accuracy, precision, recall, and F1-score respectively for the UNM dataset, whereas, 97.90%, 98%, 97.87% and 0.9794 of accuracy, precision, recall, and F1-score respectively for UCSD dataset. The results show improved scores compared to the individual Machine Learning and CNN models applied on the same datasets.



EEG preprocessing pipeline.

BMC Cancer
Ghaseimian et al., (2024) 24:4

The emerging roles of long non-coding RNA (lncRNA) H19 in gynecologic cancers

Majid Ghasemian[1†], Mojtaba Zehtabi[2†], Mahrokh Abouali Gale Dari[3], Fatemeh Khojasteh Pour[4], Ghasem Azizi Tabesh[5], Farideh Moramezi[6], Razieh Mohammad Jafari[6], Mojgan Barati[6], **Shahab Uddin**[7,8] and Maryam Farzaneh[6*]

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[4]*Department of Obstetrics and Gynecology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran*
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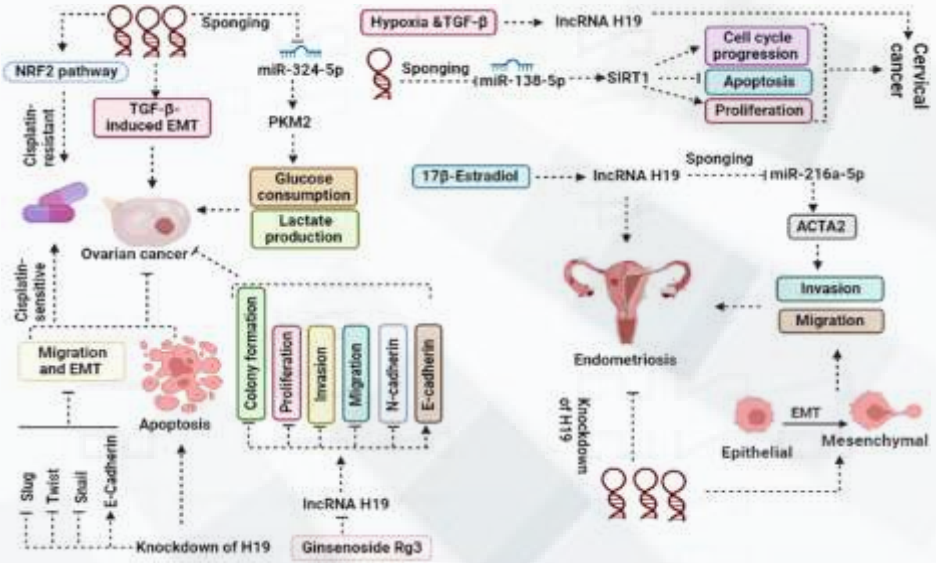
[8]***Department of Biosciences, Integral University, Lucknow, Uttar Pradesh 22602, India***

I.F. 3.4

Long non-coding RNA (lncRNA) H19 has gained significant recognition as a pivotal contributor to the initiation and advancement of gynecologic cancers, encompassing ovarian, endometrial, cervical, and breast cancers. H19 exhibits a complex array of mechanisms, demonstrating dualistic effects on tumorigenesis as it can function as both an oncogene and a tumor suppressor, contingent upon the specific context and type of cancer being investigated. In ovarian cancer, H19 promotes tumor growth, metastasis, and chemoresistance through modulation of key signaling pathways and interaction with microRNAs. Conversely, in endometrial cancer, H19 acts as a tumor suppressor by inhibiting proliferation, inducing apoptosis, and regulating epithelial-mesenchymal transition. Additionally, H19 has been implicated in cervical and breast cancers, where it influences cell proliferation, invasion, and immune evasion. Moreover, H19 has potential as a diagnostic and prognostic biomarker for gynecologic cancers, with its expression levels correlating with clinical parameters and patient outcomes. Understanding the functional roles of H19 in gynecologic cancers is crucial for the development of targeted therapeutic strategies and personalized treatment approaches. Further investigation into the intricate molecular mechanisms underlying H19's involvement in gynecologic malignancies is warranted to fully unravel its therapeutic potential and clinical implications. This review aims to elucidate the functional roles of H19 in various gynecologic malignancies.



The Mechanisms of H19 in Regulating Tumor Cell Behavior in Ovarian Cancer, Cervical Cancer, and Endometriosis. H19 plays a crucial role in promoting tumor progression through various mechanisms, including apoptosis inhibition, promotion of epithelial-to-mesenchymal transition (EMT), tumor cell invasion, migration, and proliferation. Of these mechanisms, the activation of EMT is particularly pivotal in promoting tumorigenesis via H19

Heliyon
Pandey et al., (2024) 10:e22437

Bioactive properties of clove (Syzygium aromaticum) essential oil nanoemulsion: A comprehensive review

Vinay Kumar Pandey[a], Shivangi Srivastava[b], **Ashish**[a], Kshirod Kumar Dash[c,*], **Rahul Singh**[a,**], Aamir Hussain Dar[d], **Tripti Singh**[f], **Alvina Farooqui**[a], Ayaz Mukkaram Shaikh[c], Bela Kovacs[c,***]

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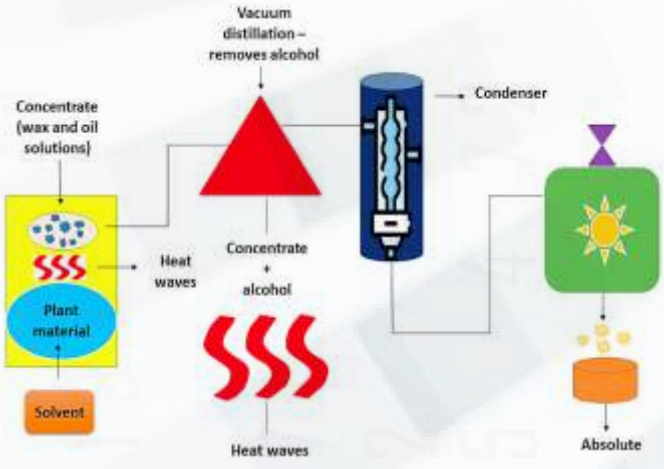
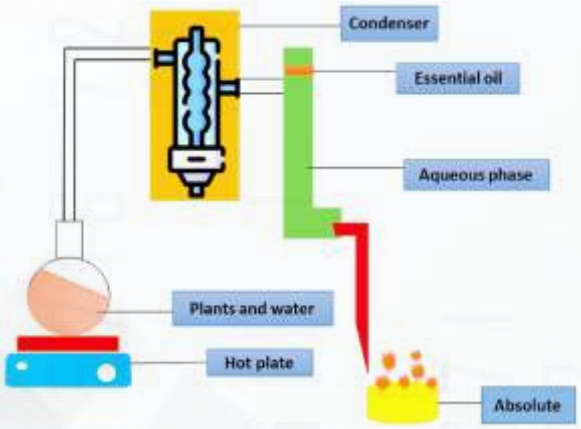
[b]*Department of Food Technology, Harcourt Butler Technical University, Nawabganj, Kanpur, Uttar Pradesh, India*
[c]*Department of Food Processing Technology, Ghani Khan Choudhury Institute of Engineering and Technology (GKCIET), Malda, West Bengal, 732141, India*
[d]*Department of Food Technology, Islamic University of Science and Technology, Kashmir, India*
[e]*Faculty of Agriculture, Food Science and Environmental Management, Institute of Food Science, University of Debrecen, Debrecen, 4032, Hungary*
[f]***Department of Biosciences, Integral University, Lucknow, Uttar Pradesh, India***

I.F. 3.4

Syzygium aromaticum, commonly called clove, is a culinary spice with medical uses. Clove is utilized in cosmetics, medicine, gastronomy, and agriculture due to its abundance of bioactive components such as gallic acid, flavonoids, eugenol acetate, and eugenol. Clove essential oil has been revealed to have antibacterial, antinociceptive, antibacterial activities, antifungal, and anticancerous qualities. Anti-inflammatory chemicals, including eugenol and flavonoids, are found in clove that help decrease inflammation and alleviate pain. The anti-inflammatory and analgesic qualities of clove oil have made it a popular natural cure for toothaches and gum discomfort. Due to its therapeutic potential, it has been used as a bioactive ingredient in coating fresh fruits and vegetables. This review article outlines the potential food processing applications of clove essential oil. The chemical structures of components, bioactive properties, and medicinal potential of clove essential oil, including phytochemical importance in food, have also been thoroughly addressed.



Diagrammatic representation of Solvent extraction.



Method of Hydro distillation extraction.

BMC Complementary Medicine and Therapies
Khan et al., (2024) 24:8

Structure based docking and biological evaluation towards exploring potential anti-cancerous and apoptotic activity of 6-Gingerol against human prostate carcinoma cells

Habiba Khan[1*], Iqbal Azad[2], Zeeshan Arif[3,4], Shama Parveen[1], Saurabh Kumar[1], Juhi Rais[5], **Jamal Akhtar Ansari[2]**, **Malik Nasibullah[2]**, Sudhir Kumar[1] and Md Arshad[6*]

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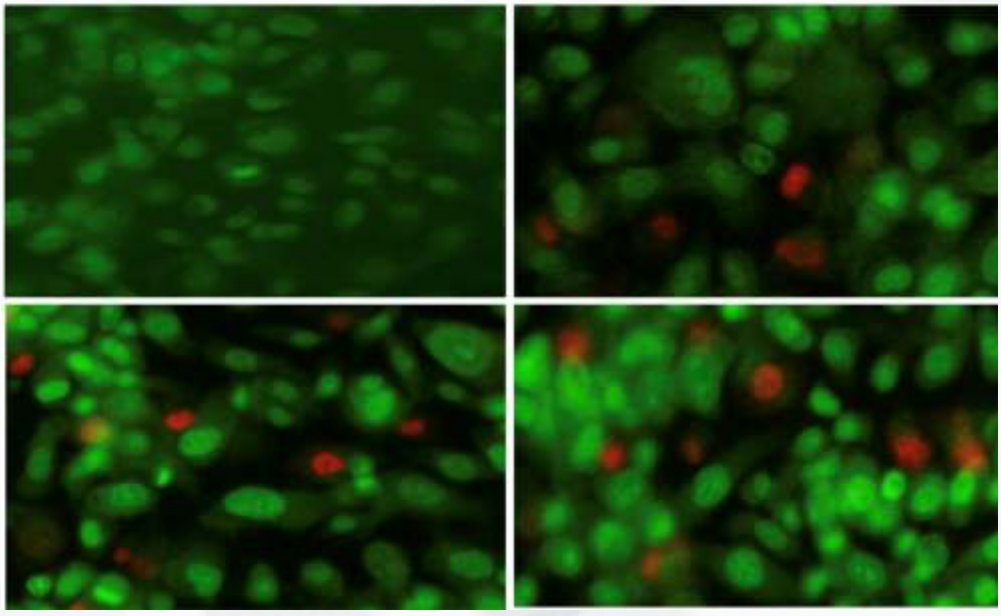
I.F. 3.3

Background : 6-Gingerol (6-G) is the primary active phytocomponent of ginger and has been shown to regulate multiple targets against cancer and its treatment. Androgen receptors (ARs) remain critical in the progression of prostate cancer (PCa). This study focuses on investigating 6-G as a promising anti-cancerous agent that inhibits AR activity significantly.

Methods : In this study, molecular docking simulation was done to investigate the binding affinity of 6-G and control drug Bicalutamide (BT) against oncogenic AR and tumor suppressor estrogen receptor β (ERβ). The crystal structure of AR and ERβ was retrieved from Protein Data Bank (PDB) and docked with 3D Pubchem structures of 6-G using iGEMDOCK and AutoDock. Further in vitro study was done to evaluate the antioxidant, anti-cancerous, apoptotic, and wound healing potential of 6-G.

Results : The result displays that 6-G shows good binding affinity with AR and ERβ. Condensation of the nucleus, change in mitochondrial membrane potential (MMP) and the ability to induce reactive oxygen species (ROS) were done in human PCa PC-3 cells. Results from the MTT assay demonstrated that 6-G and control drug BT showed significant ($p < 0.01$) dose and time dependent inhibition of human PCa PC-3 cells. 6-G increased the ROS generation intracellularly and decreased the MMP, and cell migration in treated PCa PC-3 cells. 6-G treated cells showed fragmented, condensed chromatin and nuclear apoptotic bodies.

Conclusions : Thus, this study validates 6-G as a potential drug candidate against human PCa. However, further study of the anticancer potency of 6-G has to be done before its use for PCa treatment.



Photomicrographs showed PC-3 cells stained with AO/PI after 24 h incubation with concentrations of 80, 100 and 120 µM of 6-G. A Green and red fluorescence depicts viable and dead cells respectively. Photomicrographs show an increase in apoptosis with increasing concentrations of 6-G

Mini Review in Medicinal Chemistry
Owais et al., (2024) 24(13):1238-1251

Quinoline Derivatives as Promising Scaffolds for Antitubercular Activity : A Comprehensive Review

Mohammad Owais[1], Arun Kumar[1,*], Syed Misbahul Hasan[1], Kuldeep Singh[1], Iqbal Azad[2,*], Arshad Hussain[3], **Suvaiv[1] and Mohd Akil[2]**
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I.F. 3.3

Background: Heterocyclic compounds and their derivatives play a significant role in the design and development of novel quinoline drugs. Among the various pharmacologically active heterocyclic compounds, quinolines stand out as the most significant rings due to their broad pharmacological roles, specifically antitubercular activity, and their presence in plant-based compounds. Quinoline is also known as benzpyridine, benzopyridine, and 1-azanaphthalene. It has a benzene ring fused with a pyridine ring, and both rings share two carbon atoms. The importance of quinoline lies in its incorporation as a key component in various natural compounds found in medicinal plant families like Fumariaceae, Berberidaceae, Rutaceae, Papavaraceae, and others.

Objective: This article is expected to have a significant impact on the advancement of effective antitubercular drugs. Through harnessing the potent activity of quinoline derivatives, the research aims to make valuable contributions to combating tuberculosis more efficiently and ultimately reducing the global burden of this infectious disease.

Methods: Numerous nitrogen-containing heterocyclic compounds exhibit significant potential as antitubercular agents. These chemicals have fused aromatic nitrogen-heterocyclic nuclei that can change the number of electrons they have, which can change their chemical, physical, and biological properties. This versatility comes from their ability to bind with the receptors in multiple modes, a critical aspect of drug pharmacological screening. Among these compounds, quinoline stands out as it incorporates a stable fusion of a benzene ring with a pyridine nucleus. Quinolines have demonstrated a diverse range of pharmacological activities, including but not limited to anti-tubercular, anti-tumor, anticoagulant, anti-inflammatory, antioxidant, antiviral, antimalarial, anti-HIV, and antimicrobial effects.

Results: Some molecules, such as lone-paired nitrogen species, include pyrrole, pyrazole, and quinoline. These molecules contain nitrogen and take part in metabolic reactions with other molecules inside the cell. However, an excessive accumulation of reactive nitrogen species can lead to cytotoxicity,
resulting in damage to essential biological macromolecules. Among these compounds, quinoline stands out as the oldest and most effective one, exhibiting a wide range of significant properties such as antitubercular, antimicrobial, anti-inflammatory, antioxidant, analgesic, and anticonvulsant activities. Notably, naturally occurring quinoline compounds, such as quinine, have proven to be potent antimalarial drugs.

Conclusion: This review highlights quinoline derivatives' antitubercular potential, emphasizing recent research advancements. Utilizing IC50 values, the study emphasizes the efficacy of various quinoline substitutions, hybrids, and electron-withdrawing groups against MTB H37Rv. Continued research is essential for developing potent, low-toxicity quinoline derivatives to combat tuberculosis.

Various quinoline substitutions and hybrids, encompassing imidazole, oxazole, isoxazole, pyrazole, pyrrol, sulfonamide, thiazolidinone, oxazolidinone, azetidinone, acetone-hydrazone, thiourea, hydrazine, urea, piperazine, pyrimidine, pyridine, priazole, and petrazole, demonstrate anti-tubercular activity against MTB H37Rv. This activity is observed in conjunction with diverse electron-withdrawing groups (EWG), such as -CF3, -COO, >CO, -CN, -F, -Cl, -Me, -MeO, -OH, NH2, and >NH.

Pathogens
Malik et al., (2023) 12(7):934

Molecular Characterization of Rotavirus C from Rescued Sloth Bears, India: Evidence of Zooanthroponotic Transmission

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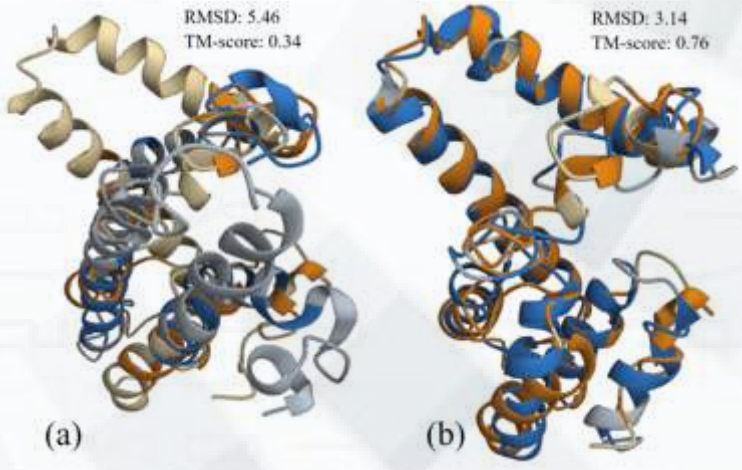
I.F. 3.3

The present study reports the detection and molecular characterisation of rotavirus C (RVC) in sloth bears (Melursus ursinus) rescued from urban areas in India. Based on an RVC VP6 gene-targeted diagnostic RT-PCR assay, 48.3% (42/87) of sloth bears tested positive for RVC infection. The VP6, VP7, and NSP4 genes of three sloth bear RVC isolates (UP-SB19, 21, and 37) were further analysed. The VP6 genes of RVC UP-SB21 and 37 isolates were only 37% identical. The sequence identity, TM-score from structure alignment, and selection pressure (dN/dS) of VP6 UP-SB37 with pig and human RVCs isolates were (99.67%, 0.97, and 1.718) and (99.01%, 0.93, and 0.0340), respectively. However, VP6 UP-SB21 has an identity, TM-score, and dN/dS of (84.38%, 1.0, and 0.0648) and (99.63%, 1.0, and 3.7696) with human and pig RVC isolates, respectively. The VP7 genes from UP-SB19 and 37 RVC isolates were 79.98% identical and shared identity, TM-score, and dN/dS of 88.4%, 0.76, and 5.3210, along with 77.98%, 0.77, and 4.7483 with pig and human RVC isolates, respectively. The NSP4 gene of UP-SB37 RVC isolates has an identity, TM-score, and dN/dS of 98.95%, 0.76, and 0.2907, along with 83.12%, 0.34, and 0.2133 with pig and human RVC isolates, respectively. Phylogenetic analysis of the nucleotide sequences of the sloth bear RVC isolates assigned the isolate UP-SB37 to genotype G12, I2 for RVC structural genes VP7 and VP6, and E1 for NSP4 genes, respectively, while isolates UP-SB19 and UP-SB21 were classified as genotype G13 and GI7 based on the structural gene VP7, respectively. The study suggests that the RVCs circulating in the Indian sloth bear population are highly divergent and might have originated from pigs or humans, and further investigation focusing on the whole genome sequencing of the sloth bear RVC isolate may shed light on the virus origin and evolution.



NSP4 UP-SB37 protein structure (brown) aligned with proteins (blue) from human (a) and pig RVC isolates (b). RMSD value indicates how well the structure alignment is, and TM Score indicates the relatedness between two structures

Plasmonics

Yadav et al., (2023) 18:2273-2283

Improved Surface Plasmon Effect in Ag-based SPR Biosensor with Graphene and WS2: An Approach Towards Low Cost Urine-Glucose Detection

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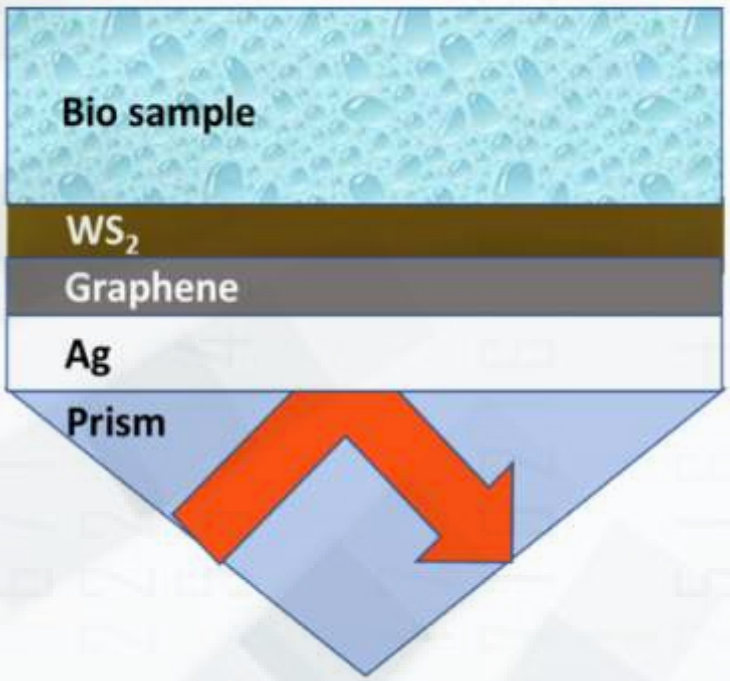
I.F. 3.3

Gold and silver are the two notable noble metals with wide implications in surface plasmon resonance (SPR) based sensors. Gold possesses a superior SPR phenomenon compared to silver, however, with extremely high costs. To resolve this problem, the current study proposes a new gold–free SPR biosensor design employing silver as the noble metal for efficient detection of blood glucose using urine as the biosample. The proposed design employs two types of 2D materials such as graphene and tungsten disulfide (WS2) to enhance the sensitivity of the silver-based SPR biosensor. An investigation for design of a low-cost biosensor for urine-glucose detection is done using the proposed configuration. The glucose concentration in the biosample ranges from 0 to 15 mg/dl (for normal persons) and 0.625 gm/dL, 1.25 gm/dL, 2.5 gm/dL, 5 gm/dL, and 10 gm/dL (for diabetic persons), with corresponding refractive indices of 1.335, 1.336, 1.337, 1.338, 1.341, and 1.347. The material's type, order, and thickness have been chosen through numerous case studies. It is worth noting that, with 4-layer graphene (0.34 nm) and 4-layer WS2 (0.8 nm), the proposed silver-based SPR biosensor shows improved sensitivity (288.86o/RIU) and figure of merit (88.89/RIU) than its gold-based counterpart (sensitivity 150o/RIU). Finally, this study is also comparedwith similar reported literatures. The proposed structure has potential to develop low-cost and efficient SPR-based biosensors(glucose sensors), with a substantial shift in resonance angle of SPR curves as shown in the present study.



Schematic of the proposed Graphene-WS2 based five layered SPR biosensor structure

International Journal of Food Science + Technology
Akhtar et al., (2024) 59, 460-461

Plant proteins for sustainable food production: "Serving present to secure the future"

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[2]*Novel Global Community Educational Foundation, Hebersham, New South Wales 2770, Australia*
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I.F. 3.3

The world faces a critical moment in its endeavour to nourish a growing global populace. Projections indicate that by 2050, Earth will accommodate 9.7 billion individuals, demanding a staggering 70% increase in food production. Nonetheless, our prevailing food production paradigm is confronting severe environmental repercussions, including ecosystem degradation, biodiversity loss and the exacerbation of climate change. It is irrefutable that our conventional reliance on animalbased proteins is unsustainable, making it imperative to initiate a gradual transition towards plant-based protein sources to ensure the sustainability of our food systems. Plant-based proteins represent a beacon of hope in our pursuit of sustainability. Their extensive history of cultivation, cost-effective production and global availability provide a potential avenue to mitigate resource strain. Furthermore, they inherently exhibit greater environmental sustainability than animal-based counterparts. However, this transition to plant-based proteins is not devoid of challenges. Despite their abundance, plant proteins frequently exhibit inferior quality and functionality, constraining their utility in food products. To surmount these challenges, investment in the advancement of plant protein technology is crucial. This includes the development of cost-effective extraction and processing techniques, exploration of novel plant sources and leveraging genetic engineering to enhance the quality and functionality of plant proteins. The objective extends beyond minimising environmental impact; it involves the creation of an equitable, resilient and healthful food system for all. While plant agriculture carries its own risks, such as pesticide usage, the adoption of organic farming practices can mitigate these concerns, contributing to improved soil health and reduced environmental footprints. Furthermore, the shift towards plant-based proteins can alleviate the demand for land, water and other resources associated with animal protein production, thus lightening the burden on our planet. Plant-based proteins are gaining attraction owing to their diminished carbon, water and energy footprints. They serve as a commendable source of essential amino acids and vital macronutrients, sufficient for achieving comprehensive protein nutrition. Additionally, they have shown positive impacts on gut health, cardiovascular well-being and weight management. Plant proteins hold promise due to their historical usage in crop cultivation, economical production and widespread accessibility across diverse regions. Nevertheless, studies often report lower protein quality in plant proteins than in their animal counterparts. Several well-known legume crops, such as soybean, common beans, peas and chickpeas, are already recognised for their protein and nutritional content. Various processing techniques, including enzymatic hydrolysis, fermentation and extrusion, have been developed to enhance the nutritional quality of plant proteins. These technologies have demonstrated cost-effectiveness and environmental friendliness. Furthermore, plant-based proteins exhibit significantly greater environmental sustainability than animal-based counterparts, characterised by reduced carbon, water and energy footprints. Thus, the adoption of plant-based proteins can contribute to the reduction in the environmental impact associated with food production.

Journal of Transport & Health
Aafreen et al., (2023) 33:101719

Decoding the impact of driving postures: Comparing neck pain, mobility, proprioception in car and bike drivers with and without Forward Head Posture

Aafreen Aafreen[a], Abdur Raheem Khan[a], Ashfaque Khan[a], Ausaf Ahmad[b], Mohammad Abu Shaphe[d], Abdullah Alzahrani[c], Abdullah Alhusayni[c], Abdulaziz H. Alameer[d], Ramzi Abdu Alajam[d]

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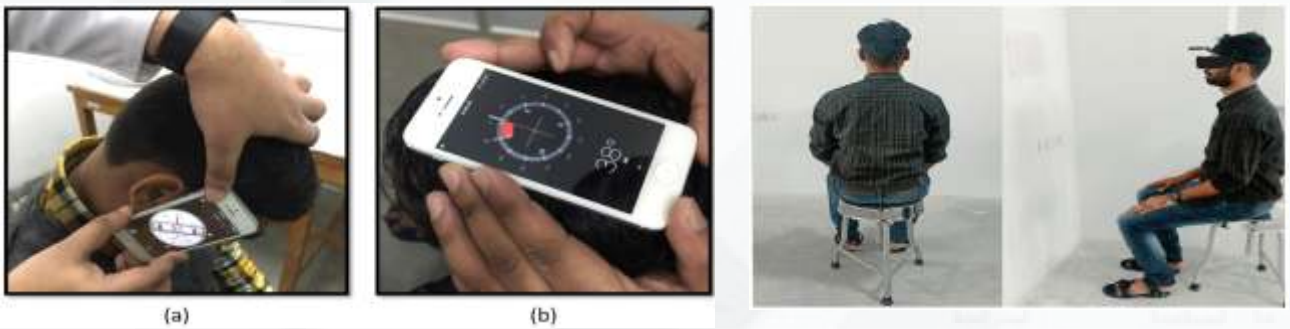
I.F. 3.2

Objectives : The study sought to examine the effects of Forward Head Posture (FHP) on neck pain, cervical mobility, and proprioception in drivers. Additionally, it aimed to ascertain if the influence of FHP varied between car and bike drivers.

Methods : Employing a comparative cross-sectional approach, 100 drivers (50 car drivers and 50 bike users) aged 18–65, each reporting a minimum of 10 h of driving weekly, were studied. Participants were categorized based on the presence or absence of FHP. Assessment tools encompassed Surgimap for FHP detection, the Visual Analogue Scale (VAS) for pain intensity, the Cervical Range of Motion (CROM) for mobility, and the Joint Position Error Test (JPET) for proprioception.

Results : 60% of participants manifested FHP. At 70%, car drivers had a notably higher prevalence of FHP than bike drivers at 50%. Marked cervical mobility and proprioception differences were observed between drivers with and without FHP. Car drivers with FHP recorded an average pain score of 6.8 ± 1.2 on the VAS, significantly higher than the 3.1 ± 0.8 reported by those without FHP. Bike drivers with FHP reported elevated pain scores (5.9 ± 1.1) compared to those without FHP (3.4 ± 0.7).

Conclusion : The findings underscore the significant repercussions of FHP on neck pain intensity, cervical mobility, and proprioception in drivers. Notably, vehicle type emerges as a critical factor, with car drivers displaying a heightened vulnerability compared to bike riders. This research emphasizes the importance of tailored interventions, informed driver education, and vehicle-specific ergonomic modifications to foster better postural health among drivers.



Measurement of cervical range and neck proprioception

Life
Alqhtani et al., (2023) 13(12):2258

Synergistic Benefits of Motor Control Exercises and Balance Training in Sacroiliac Joint Dysfunction: A Randomized Controlled Trial

Raee Saeed Alqhtani[1], Hashim Ahmed[1], Adel Alshahrani[1], Abdullah Mohammed Alyami[1], **Abdur Raheem Khan[2], Ashfaque Khan[2]**

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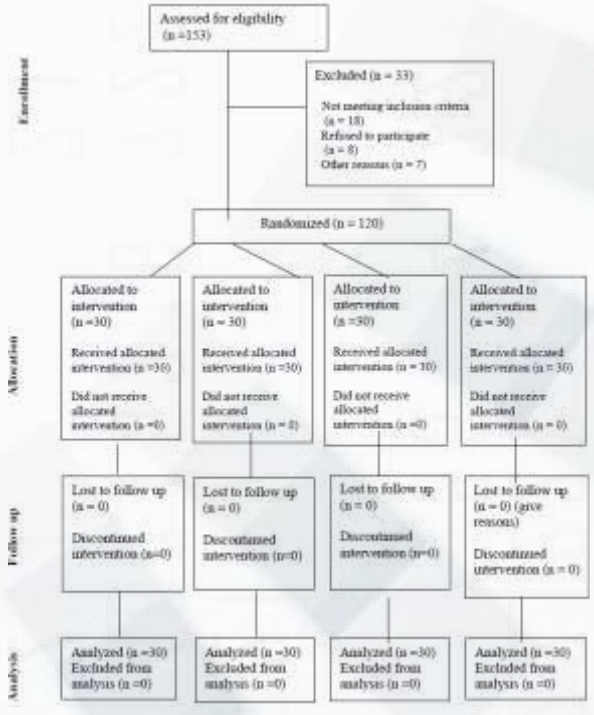
I.F. 3.2

Background: and Objectives: Chronic low back pain, frequently attributed to Sacroiliac Joint Dysfunction (SIJD), remains a prevalent concern in orthopedic and physiotherapy arenas. Despite the recognition of motor control exercises (MCEs) and balance training (BT) as potential rehabilitative measures, studies elucidating their combined efficiency for SIJD are scarce. This research study aimed to ascertain the combined and individual efficacies of MCE and BT in alleviating SIJD symptoms.

Methods: A double-blinded randomized controlled trial was conducted, enrolling 120 SIJD-diagnosed patients aged 30–60 years. Participants were randomly allocated into four groups: MCEs alone, BT alone, combined MCEs and BT, and a control group receiving usual care. Interventions spanned 12 weeks, with evaluations at the start and end and a 24-week follow-up. Primary outcomes encompass pain intensity (assessed via Visual Analog Scale), functional disability (utilizing the Oswestry Disability Index), and life quality (using the Short Form-36).

Results: Post a 12-week intervention, participants receiving combined MCE and BT demonstrated substantial improvements in VAS (Median: 3.5, IQR: 2–5; p = 0.0035), ODI (Median: 15%, IQR: 10–20%; p = 0.0035), and SF-36 scores (Median: 70, IQR: 65–75; p = 0.0035) compared to baseline. In contrast, standalone MCE or BT and control groups exhibited lesser efficacy. By the 24-week follow-up, the combined group maintained their gains, outperforming the other groups. The research tools employed showed high reliability with Cronbach's alpha >0.85.

Conclusions: Our findings underscore the superior efficacy of integrating motor control exercises (MCEs) and balance training (BT) for Sacroiliac Joint Dysfunction (SIJD)-related chronic low back pain. This combined approach promises enhanced patient outcomes, highlighting its potential as a primary strategy in SIJD management. Future studies should further explore its long-term benefits and integration with other therapeutic modalities.



Effects of Motor Control Exercises and Balance Training in Sacroiliac Joint Dysfunction

Life
Alyahyawi et al., (2023) 13(10):1986

Identification of Glycoxidative Lesion in Isolated Low-Density Lipoproteins from Diabetes Mellitus Subjects

Amjad R Alyahyawi[1,2], Mohd Yasir Khan[3], Sultan Alouffi[4], Farah Maarfi[3], Rihab Akasha[4], Saif Khan[5], **Zeeshan Rafi[6]**, Talal Alharazi[4] et al.

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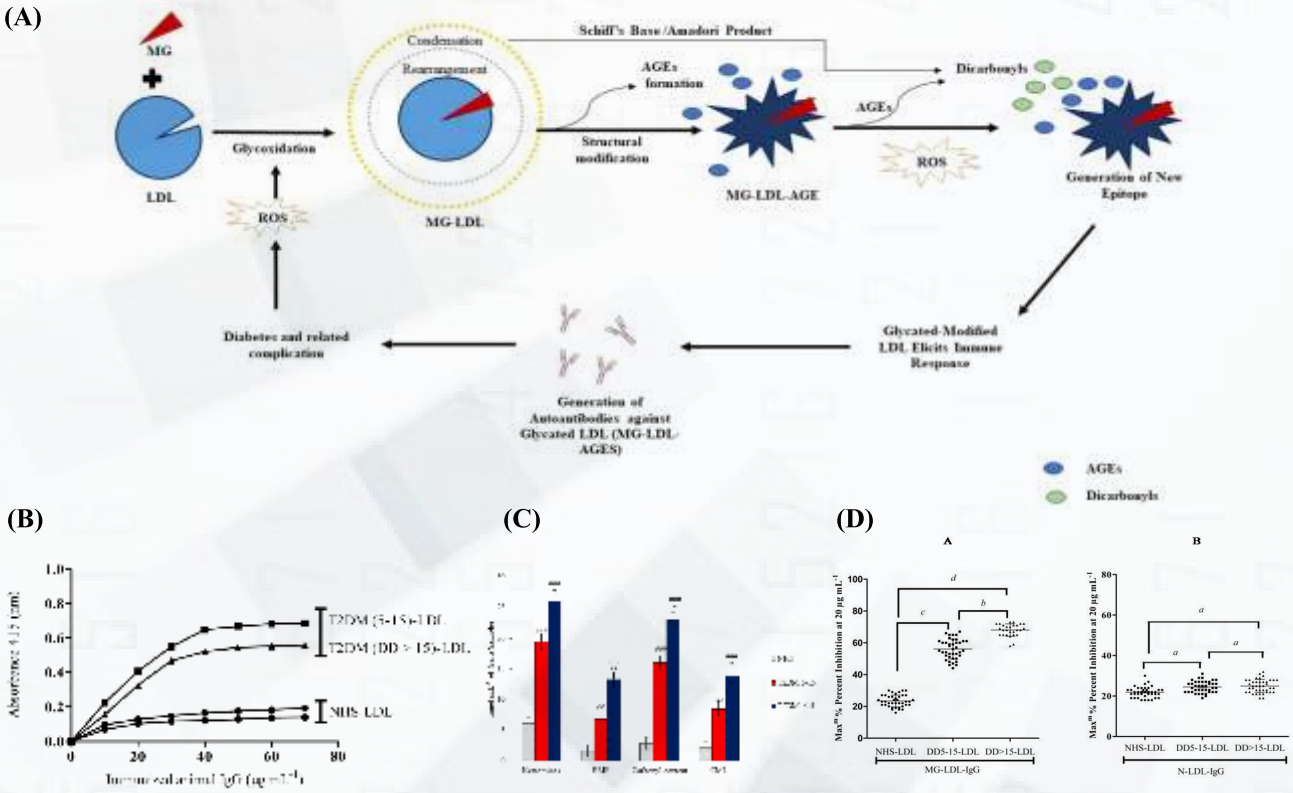
[6]***Department of Bioengineering, Integral University, Lucknow 226026, India.***

I.F. 3.2

Methylglyoxal (MG) is a precursor for advanced glycation end-products (AGEs), which have a significant role in diabetes. The present study is designed to probe the immunological response of native and glycated low-density lipoprotein (LDL) in experimental animals. The second part of this study is to probe glycoxidative lesion detection in low-density lipoproteins (LDL) in diabetes subjects with varying disease duration. The neo-epitopes attributed to glycation-induced glycoxidative lesion of LDL in DM patients' plasma were, analyzed by binding of native and MG-modified LDL immunized animal sera antibodies using an immunochemical assay. The plasma purified human LDL glycation with MG, which instigated modification in LDL. Further, the New Zealand-White rabbits were infused with unmodified natural LDL (N-LDL) and MG-glycated LDL to probe its immunogenicity. The glycoxidative lesion detection in LDL of DM with disease duration (D.D.) of 5-15 years and D.D. > 15 years was found to be significantly higher as compared to normal healthy subjects (NHS) LDL. The findings support the notion that prolonged duration of diabetes can cause structural alteration in LDL protein molecules, rendering them highly immunogenic in nature. The presence of LDL lesions specific to MG-associated glycoxidation would further help in assessing the progression of diabetes mellitus.



Identification of Glycoxidative Lesions

European Journal of Biology
Husain et al., (2024) 83(1):94-105

From Pond Scum to Miracle Molecules: Cyanobacterial Compounds New Frontiers

Arbab Husain[1], **Md Nematullah**[2], Hamda Khan[3], Ravi Shekher[1], **Alvina Farooqui**[4], Archana Sahu[5], Afreen Khanam[1]

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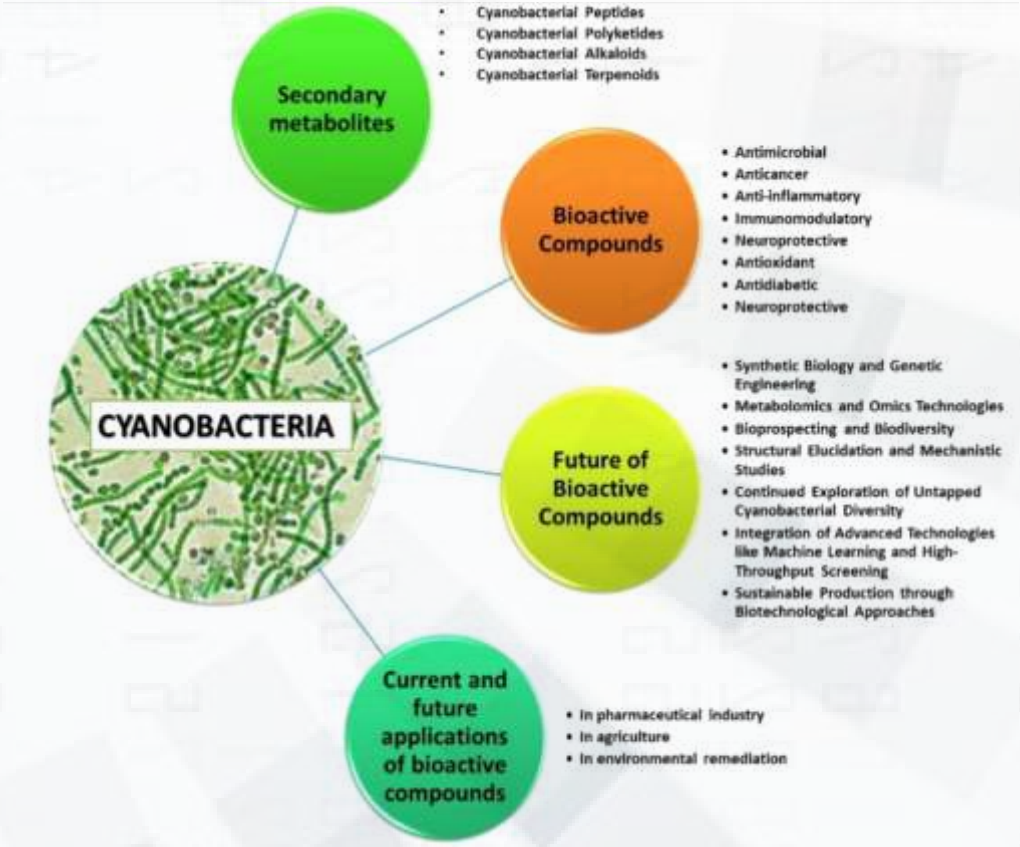
I.F. 3.2

Cyanobacteria are a diverse group of photosynthetic microorganisms known for their production of bioactive compounds with various biological activities. This review explores cyanobacterial bioactive compounds' current and future prospects and their roles in different fields. These compounds have great potential for pharmaceuticals, agriculture, and environmental remediation applications. Cyanobacterial bioactive compounds, such as cyanotoxins, peptides, polyketides, alkaloids, and terpenoids, exhibit remarkable properties, including antimicrobial, antifungal, antiviral, antioxidant, anti-inflammatory, and anticancer activities. Advances in genomics, metabolomics, synthetic biology, screening techniques, and bioinformatics have facilitated the identification, characterization, and manipulation of cyanobacterial compounds. The future prospects involve exploring untapped cyanobacterial diversity, integrating advanced technologies like machine learning and high-throughput screening, and sustainable production through biotechnological approaches. These efforts hold promise for discovering new bioactive compounds with unique properties and applications, contributing to the development of innovative pharmaceuticals, agricultural solutions, and environmental remedies.



Cyanobacterial compounds: diversity and properties

Physical Review
Khan et al., (2024) 10:15201

Thermoelectric response of a hot and weakly magnetized anisotropic QCD medium

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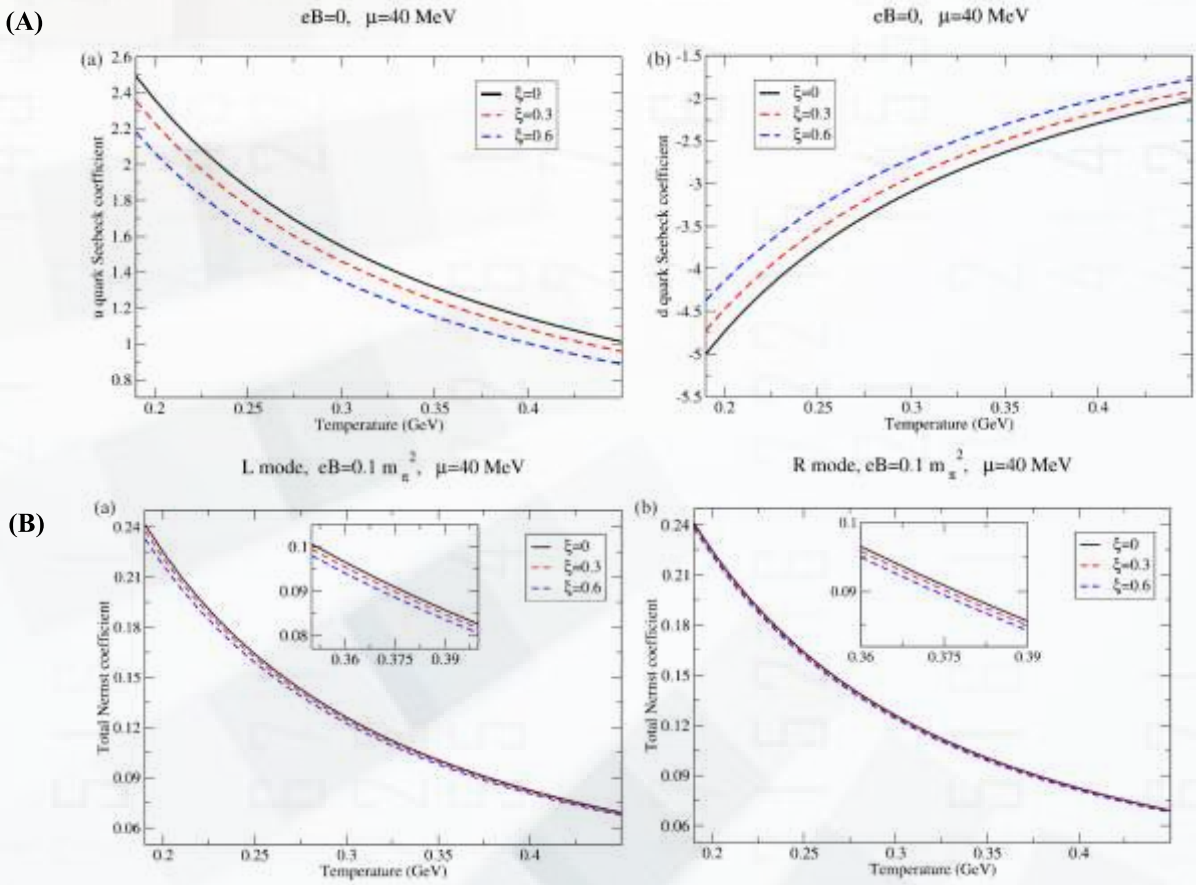
[3]*Department of Physics, Indian Institute of Technology Bombay, Mumbai 400076, India*

I.F. 3.2

We have studied the Seebeck and Nernst coefficients of a weakly magnetized hot QCD medium having a weak momentum anisotropy within the kinetic theory approach. The thermal medium effects have been incorporated in the framework of a quasiparticle model where the medium dependent mass of the quark has been calculated using perturbative thermal QCD in the presence of a weak magnetic field, which leads to different masses for the left (L) and right (R) handed chiral quark modes. We have found that the Seebeck and Nernst coefficient magnitudes for the individual quark flavors as well as for the composite medium are decreasing functions of temperature and decreasing functions of anisotropy strength. The Nernst coefficient magnitudes are about an order of magnitude smaller than their Seebeck counterparts, indicating the Seebeck effect constitutes a stronger response than the Nernst effect. The average percentage change corresponding to switching between quasiparticle modes (L→R or R→L) is an order of magnitude smaller for Nernst coefficients, compared to the Seebeck coefficients.



Seebeck and Nernst coefficients of a weakly magnetized hot QCD medium

Life
Shaphe et al., (2023) 13(5):1169

Effectiveness of Epley-Canalith Repositioning Procedure versus Vestibular Rehabilitation Therapy in Diabetic Patients with Posterior Benign Paroxysmal Positional Vertigo: A Randomized Trial

Mohammad Abu Shaphe[1], Mohammed M. Alshehri[1], Ramzi Abdu Alajam[1], Rashid Ali Beg[1], Najat Ibrahim A. Hamdi[1], Saravanakumar Nanjan[1], Vandana Esht[1], Mohammed A. Aljahni[2], Hashim Ahmed[3], **Ausaf Ahmad[4], Aafreen[5], Ashfaque Khan[5]** and **Abdur Raheem Khan[5,*]**

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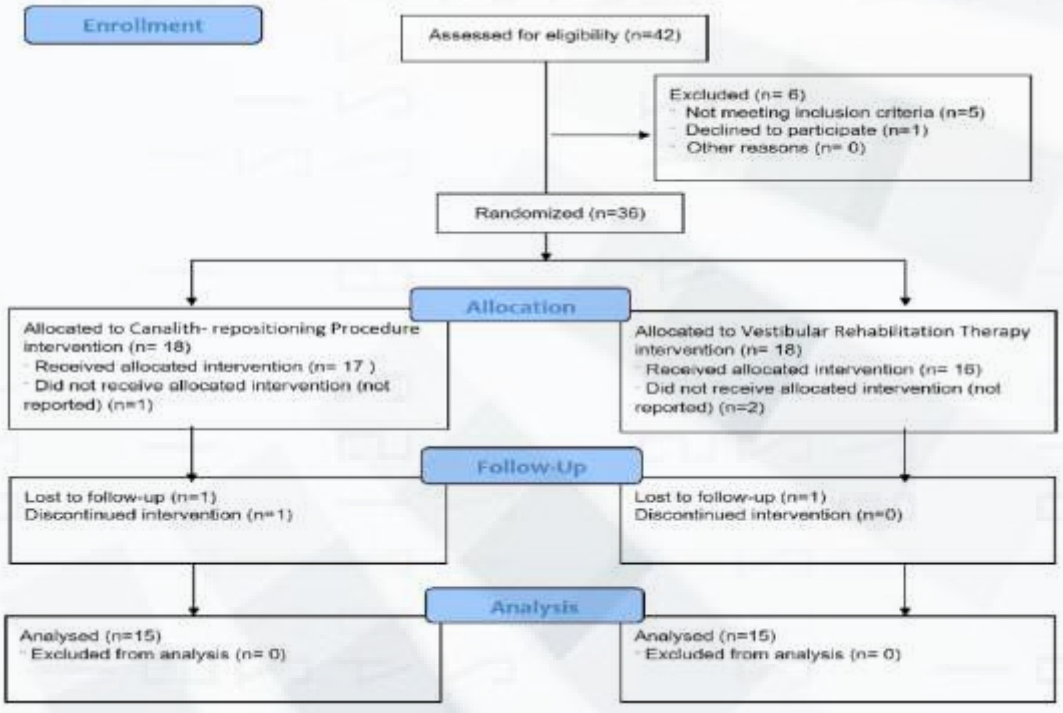
I.F. 3.2

Benign paroxysmal positional vertigo (BPPV) is a common inner ear disorder, characterized by brief episodes of vertigo caused by changes in head position. The condition can cause significant functional impairment and reduced quality of life. BPPV is especially common among diabetic patients. The Epley–canalith repositioning procedure (CRP) and vestibular rehabilitation therapy (VRT) are two commonly used interventions for the treatment of BPPV. The objective of this study is to compare the effectiveness of Epley–canalith repositioning procedure (ECRP) and Vestibular Rehabilitation (VR) therapy in the management of vertigo among Type 2 DiabetesMellitus patients. A total of 30 subjects with Type 2 diabetes mellitus, aged between 40 and 65 years, were randomly allocated to either the ECRP or VR therapy groups using a lottery method, and then underwent Epley–canalith repositioning procedure or vestibular rehabilitation therapy, respectively. The outcomes measured by the study were Vertigo Symptom Scale–Short Form (VSS–sf) score and Berg Balance Scale (BBS) score, assessed pre-treatment (pre) and 4 weeks post-treatment (post). The results demonstrated that both ECRP and VR therapy led to improvements in VSS–sf and BBS scores. However, VR therapy was found to be more effective, resulting in a 13.6% higher improvement in VSS–sf scores ($p = 0.03$) and a 5.1% higher improvement in BBS scores ($p = 0.51$) compared to ECRP. Both Epley–canalith repositioning procedure and vestibular rehabilitation therapy are effective in managing BPPV in diabetic patients. Although the differences in BBS scores are not statistically significant, VRT demonstrated a trend towards greater improvement. Vestibular rehabilitation therapy can be used by clinicians as another rehabilitation technique for improving vertigo, postural stability, and activity of daily living in diabetic patients with BPPV.



Flow diagram depicting the number of patients in each treatment group.

Metabolic Brain Disease
Yadav et al., (2024) 39:283-294

NMR based Serum metabolomics revealed metabolic signatures associated with oxidative stress and mitochondrial damage in brain stroke

Sachin Yadav[1] · Abhai Kumar[2] · Smita Singh[3] · Shahnawaz Ahmad[4] · Gurvinder Singh[5,6] ·Abdul Rahman Khan[1] Rameshwar Nath Chaurasia[4] · Dinesh Kumar[5]

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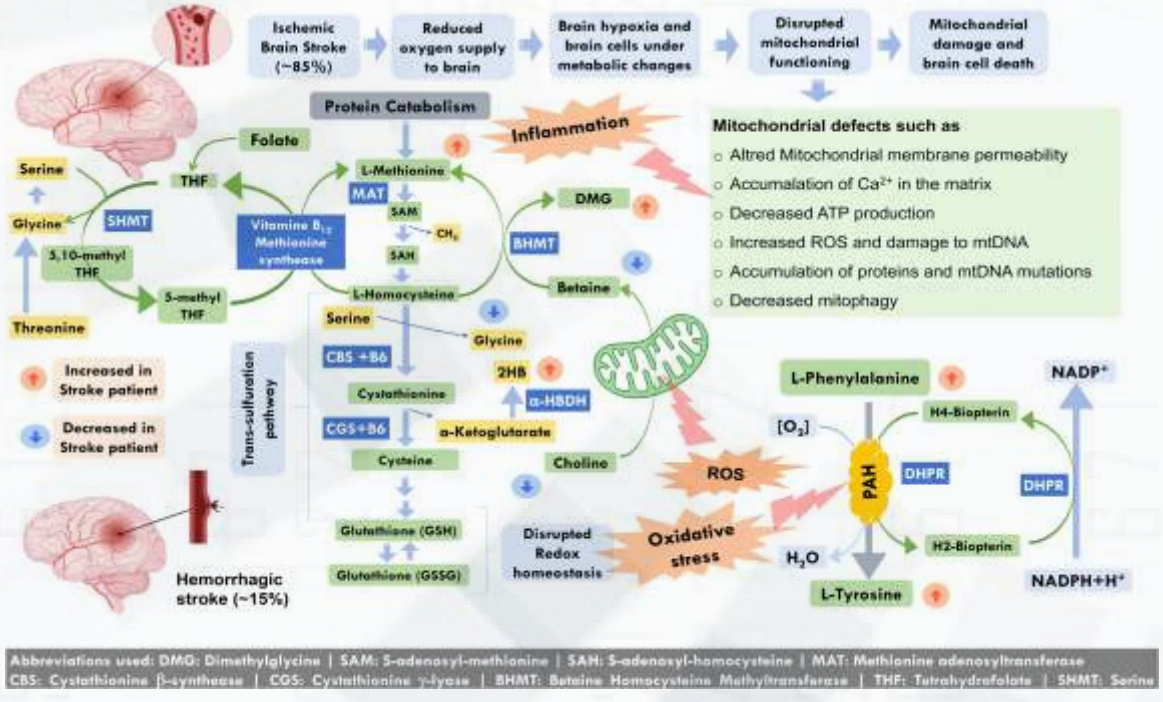
I.F. 3.2

Brain stroke (BS, also known as a cerebrovascular accident), represents a serious global health crisis. It has been a leading cause of permanent disability and unfortunately, frequent fatalities due to lack of timely medical intervention. While progress has been made in prevention and management, the complexities and consequences of stroke continue to pose significant challenges, especially, its impact on patient's quality of life and independence. During stroke, there is a substantial decrease in oxygen supply to the brain leading to alteration of cellular metabolic pathways, including those involved in mitochondrial-damage, leading to mitochondrial-dysfunction. The present proof-of-the-concept metabolomics study has been performed to gain insights into the metabolic pathways altered following a brain stroke and discover new potential targets for timely interventions to mitigate the effects of cellular and mitochondrial damage in BS. The serum metabolic profiles of 108 BS-patients were measured using 800 MHz NMR spectroscopy and compared with 60 age and sex matched normal control (NC) subjects. Compared to NC, the serum levels of glutamate, TCA-cycle intermediates (such as citrate, succinate, etc.), and membrane metabolites (betaine, choline, etc.) were found to be decreased BS patients, whereas those of methionine, mannose, mannitol, phenylalanine, urea, creatine and organic acids (such as 3-hydroxybutyrate and acetone) were found to be elevated in BS patients. These metabolic changes hinted towards hypoxia mediated mitochondrial dysfunction in BSpatients. Further, the area under receiver operating characteristic curve (ROC) values for five metabolic features (methionine, mannitol, phenylalanine, mannose and urea) found to be more than 0.9 suggesting their high sensitivity and specificity for differentiating BS from NC subjects.



The summary of the key metabolic pathways underlying cellular and mitochondrial damage during brain stroke pathology

Journal of Thermal Analysis and Calorimetry
Khan et al., (2024) 149:5569-5583

Effect of cylindrical ribs location in a fan-shaped cavity on thermo-hydraulic performance of a microchannel heatsink

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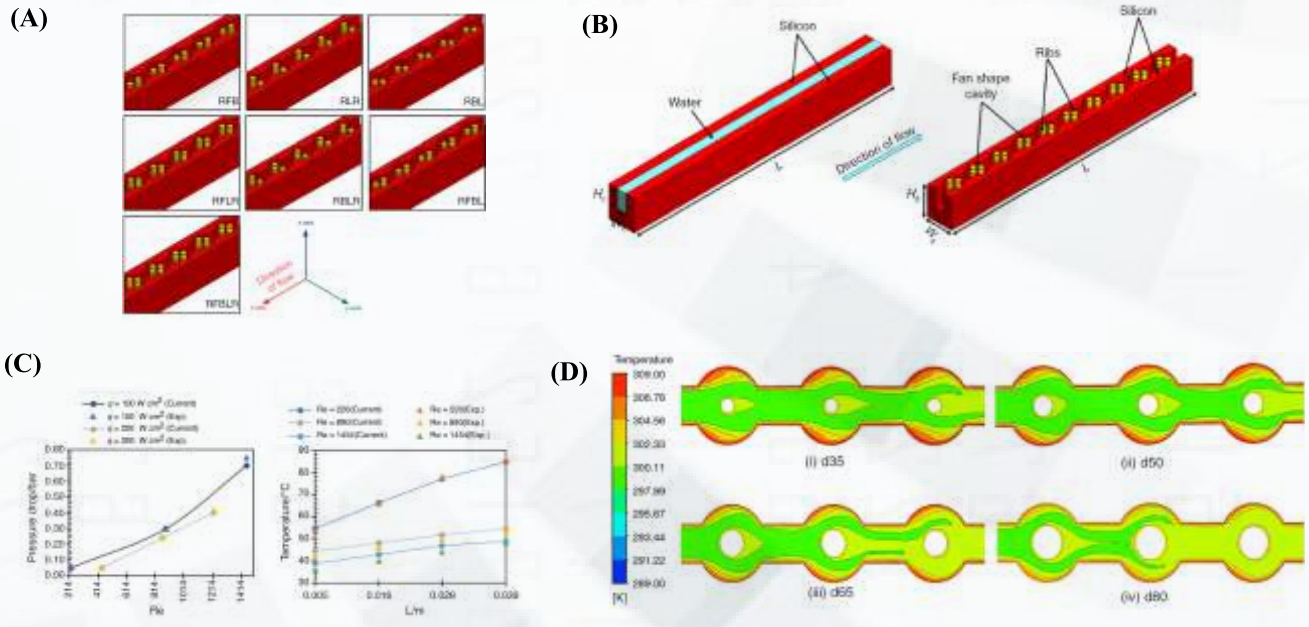
I.F. 3.2

The evolution of micromachining technology has ushered in a new era of applications for microchannel heatsinks, particularly in the domain of electronics cooling. This research endeavours to conduct a comprehensive analysis to assess the impact of circular ribs in conjunction with a fan-shaped cavity on the operational efficiency of rectangular microchannel heatsinks. Specifically, seven distinct structural configurations have been meticulously examined, each featuring ribs strategically positioned at various locations: ribs positioned at the front and back (RFB), ribs at the left and right (RLR), ribs at the back and left (RBL), ribs at the front, left, and right (RFLR), ribs at the back, left, and right (RBLR), ribs at the front, back, and left (RFBL), and ribs at the front, back, left, and right (RFBLR), for a range of Reynolds numbers spanning from 100 to 500. The findings are then compared with those obtained from a microchannel with a fan-shaped cavity only (MHFC) and a plain rectangular microchannel heatsink. The optimal diameter for the embedded ribs was determined by comparing the thermal performance of microchannel heatsinks with ribs of varying diameters: 35 µm, 50 µm, 65 µm, and 80 µm. Results indicate that the 50 µm rib diameter achieves the highest thermal performance. A key finding is that ribs act as flow disruptors, causing the flow to split into two streams towards the cavity's arcuate region and thinning the boundary layer. RFBLR showed the highest heat transfer, followed by RFLR, while RFB and RLR had the lowest heat transfer among microchannels with cavities and ribs. RFBLR also had the highest pressure drop, highlighting a trade-off between heat transfer enhancement and pressure drop. Optimizing rib placement is crucial for maximizing heat transfer efficiency at lower pressure drops. Initially, RBLR had the highest performance factor at lower Reynolds numbers, later overtaken by RLR.



Combination of Metformin and Gedunin Upregulates AMPKα1, Downregulates HSP90, and Promotes Nuclear Localization of AMPK α1/α2 in A549 Lung Cancer Cells

Soft Computing

Joshi et al., (2024) 28:5523-5540

A technique for securing digital audio files based on rotation and XOR operations

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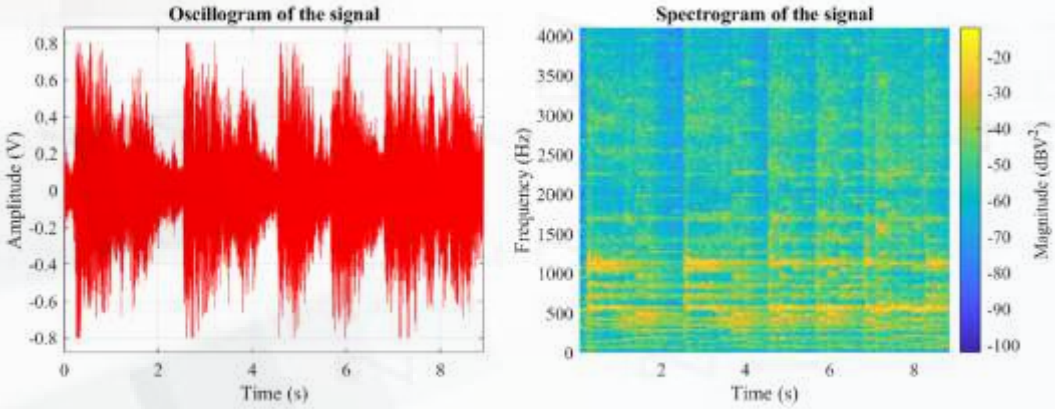
I.F. 3.1

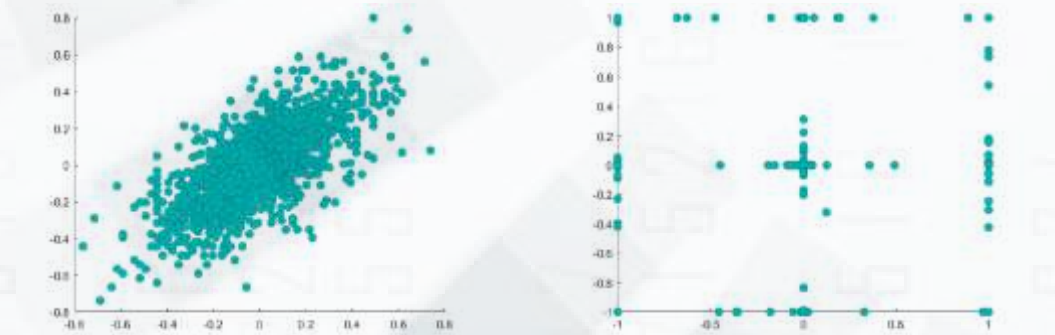
Security of digital audio files is the need of the hour. In this context, researchers have proposed several techniques for the secure communication of audio files. But unfortunately, these are vulnerable to differential attack. So, we propose a WORD-oriented technique for securing digital audio files based on rotation and XOR operations. The key concepts of the designed encryption algorithm are the RX (Rotation-XOR) operations, i.e., the plain audio samples are first left-rotated by the sum-of-digits of the previous audio samples, and then XOR-ed with the previous audio samples. The designed encryption algorithm encodes a digital audio file into a random (noise-like) audio file. Several encryption and decryption evaluation metrics, such as Adjacent Sample Correlation Coefficient (ASCC), Crest Factor (CF), Number of sample Change Rate (NSCR), Mean Square Error (MSE), Peak Signal-to-Noise Ratio (PSNR), etc., are applied on several digital audio files of varying sizes, to empirically assess the performance and efficiency of the proposed technique. The results of these metrics show that the cipher audio files have a very high key sensitivity, ideal ASCC, ideal CF, 100% NSCR score, zero MSE, and infinite PSNR. Moreover, the technique strongly resists the brute-force attack, differential attack, and other statistical attacks.

(A)



(a) Oscillogram (b) Spectrogram

(B)



(a) ASCC graph of the original handel file. (b) ASCC graph of the encrypted handel file.

Biodegradation
Amir et al., (2024) 35(2):137-153

Purification and characterization of extracellular PHB depolymerase enzyme from *Aeromonas caviae* Kuk1-(34) and their biodegradation studies with polymer films

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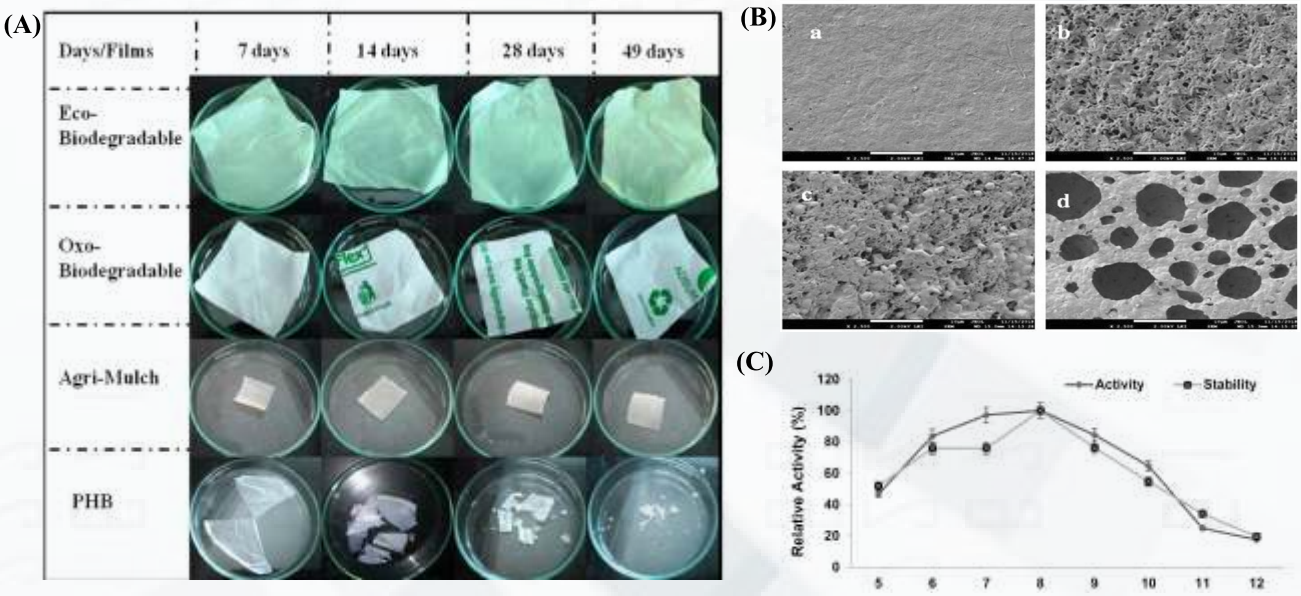
I.F. 3.1

PHB depolymerase enzymes are able to breakdown the PHB polymers and thereby get significant economic value in the bioplastics industry and for bioremediation as well. This study shows the purification of novel extracellular PHB depolymerase enzyme from *Aeromonas caviae* Kuk1-(34) using dialysis followed by gel filtration and HPLC. The purification fold and yield after HPLC were 45.92 and 27.04%, respectively. HPLC data showed a single peak with a retention time of 1.937 min. GC-MS analysis reveals the presence of three compounds, of which 1-Dodecanol was found to be most significant with 54.48% area and 8.623-min retention time (RT). The molecular weight of the purified enzyme was obtained as 35 kDa with Km and apparent Vmax values of 0.769 mg/mL and 1.89 U/mL, respectively. The enzyme was moderately active at an optimum temperature of 35 C and at pH 8.0. The stability was detected at pH 7.0–9.0 and 35–45 C. Complete activity loss was observed with EDTA, SDS, Tween-20 at 5 mM and with 0.1% Triton X 100. A biodegradation study of commercially available biodegradable polymer films was carried out in a liquid medium and in soil separately with pure microbial culture and with purified enzyme for 7, 14, 28, and 49 consecutive days. In a liquid medium, with a pure strain of *Aeromonas caviae* Kuk1-(34), the maximum degradation (89%) was achieved on the PHB film, while no changes were observed with other polymer films. With purified enzyme in the soil, 71% degradation of the PHB film was noticed, and it was only 18% in the liquid medium. All such weight analysis were confirmed by SEM images where several holes, pits, grooves, crest, and surface roughness are clearly observed. Our results demonstrated the potential utility of *Aeromonas caviae* Kuk1-(34) as a source of extracellular PHB depolymerase capable of degrading PHB under a wide range of natural/ lab conditions.



Purification and characterization of extracellular PHB depolymerase enzyme

Naunyn-Schmiedeberg's Archives of Pharmacology
Gupta et al., (2024) 397:1647-1658

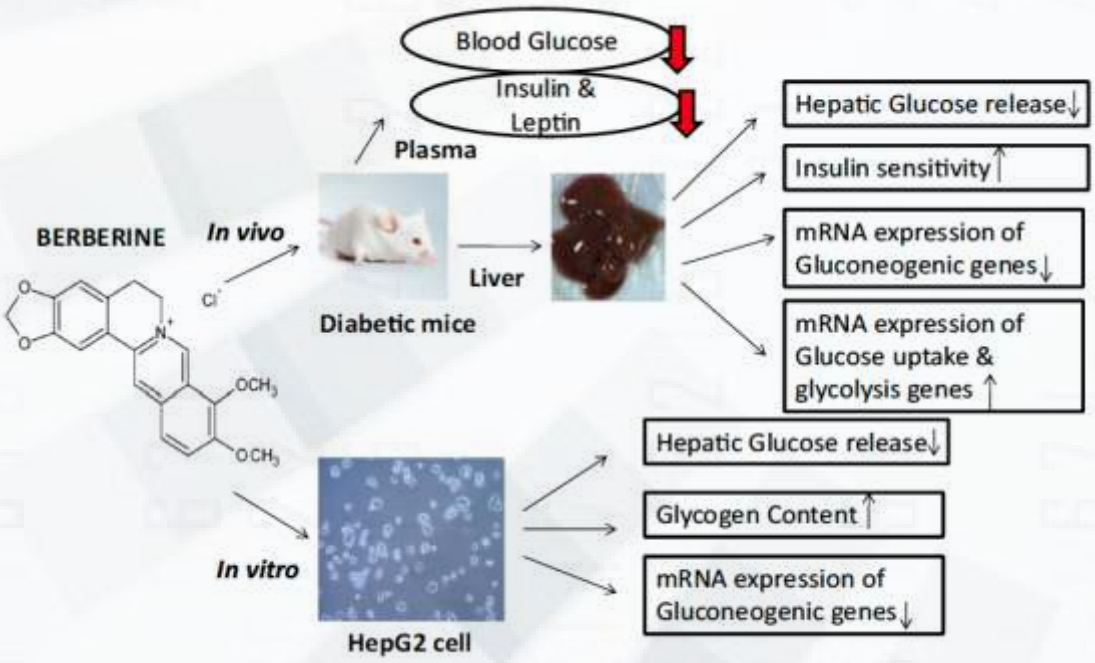
Berberine ameliorates glucocorticoid-induced hyperglycemia: an in vitro and in vivo study

Mrinal Gupta[1] · **Mohammad Rumman**[2] · Babita Singh[1] · Abbas Ali Mahdi[1] · Shivani Pandey[1]

[1]*Department of Biochemistry, King George's Medical University, Lucknow, Uttar Pradesh, India*
[2]***Department of Biosciences, Integral University, Lucknow, Uttar Pradesh, India***

I.F. 3.1

Berberine (BBR), a bioactive compound isolated from Coptidis Rhizoma, possesses diverse pharmacological activities including anti-bacterial, anti-inflammatory, antitumor, hypolipidemic, and anti-diabetic. However, its role as an anti-diabetic agent in animal models of dexamethasone (Dex)-induced diabetes remains unknown. Studies have shown that natural compounds including aloe, caper, cinnamon, cocoa, green and black tea, and turmeric can be used for treating Type 2 diabetes mellitus (DM). Compared to conventional drugs, natural compounds have less side effects and are easily available. Herein, we studied the anti-diabetic effects of BBR in a mice model of Dex-induced diabetes. HepG2 cell line was used for glucose release and glycogen synthesis studies. Cell proliferation was measured by methylthiotetrazole (MTT) assay. For animal studies, mice were treated with Dex (2 mg/kg, i.m.) for 30 days and effect of BBR at the doses 100, 200, and 500 mg/kg (p.o.) was analyzed. Glucose, insulin, and pyruvate tests were performed for evaluating the development of the diabetic model. Echo MRI was performed to assess the fat mass. Further, to elucidate the mechanism of action of BBR, mRNA expression of genes regulating gluconeogenesis, glucose uptake, and glycolysis was analyzed. In vitro BBR had no impact on cell viability up to a concentration of 50 µM. Moreover, BBR suppressed the hepatic glucose release and improved glucose tolerance in HepG2 cells. In vivo, BBR improved glucose homeostasis in diabetic mice as evidenced by enhanced glucose clearance, increased glycolysis, elevated glucose uptake, and decreased gluconeogenesis. Further, Dex treatment increased the total fat mass in mice, which was ameliorated by BBR treatment. BBR improves glucose tolerance by increasing glucose clearance, inhibiting hepatic glucose release, and decreasing obesity. Thus, BBR may become a potential therapeutic agent for treating glucocorticoid-induced diabetes and obesity in the future.



BBR improves glucose homeostasis in HepG2 cells and Dex induced diabetic mice

Applied Biochemistry and Biotechnology
Hasan et al., (2023) 195(12):7338-7378

Targeted Inhibition of Hsp90 in Combination with Metformin Modulates Programmed Cell Death Pathways in A549 Lung Cancer Cells

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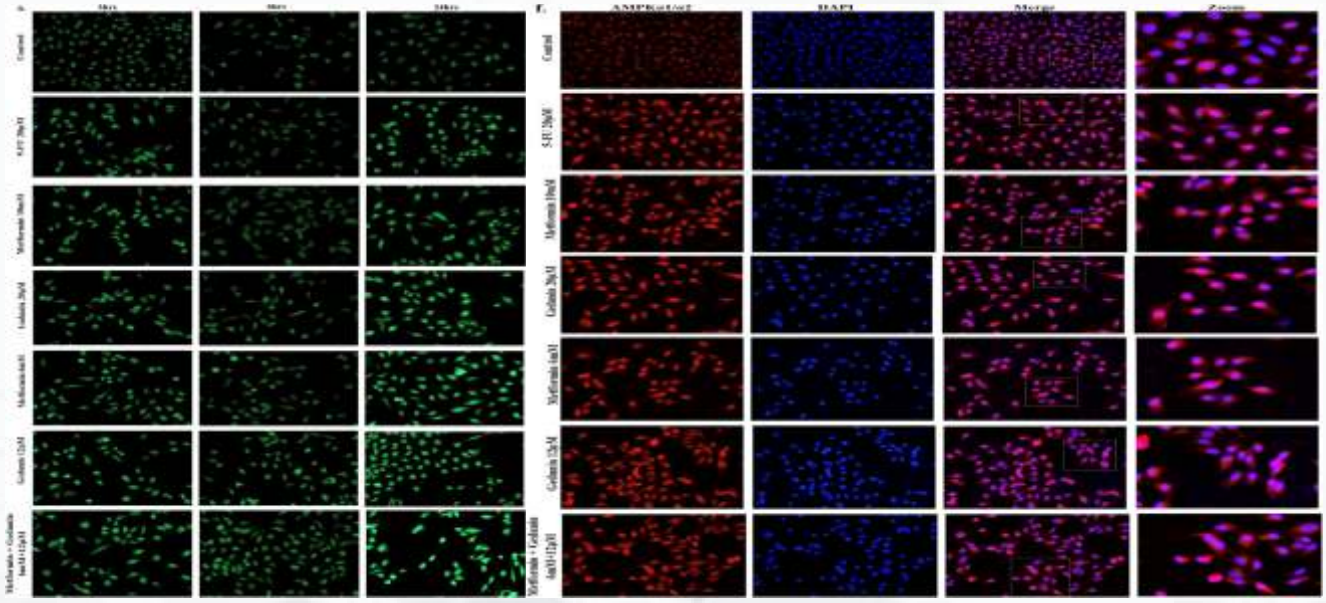
[7]***Department of Biosciences, Faculty of Science, Integral University, Kursi Road, Lucknow 226026, India***

I.F. 3.1

The pathophysiology of lung cancer is dependent on the dysregulation in the apoptotic and autophagic pathways. The intricate link between apoptosis and autophagy through shared signaling pathways complicates our understanding of how lung cancer pathophysiology is regulated. As drug resistance is the primary reason behind treatment failure, it is crucial to understand how cancer cells may respond to different therapies and integrate crosstalk between apoptosis and autophagy in response to them, leading to cell death or survival. Thus, in this study, we have tried to evaluate the crosstalk between autophagy
and apoptosis in A549 lung cancer cell line that could be modulated by employing a combination therapy of metformin (6 mM), an anti-diabetic drug, with gedunin (12 µM), an Hsp90 inhibitor, to provide insights into the development of new cancer therapeutics. Our results demonstrated that metformin and gedunin were cytotoxic to A549 lung cancer cells. Combination of metformin and gedunin generated ROS and promoted MMP loss and DNA damage. The combination further increased the expression of AMPKα1 and promoted the nuclear localization of AMPKα1/α2. The expression of Hsp90 was downregulated, further decreasing the expression of its clients, EGFR, PIK3CA, AKT1, and AKT3. Inhibition of the EGFR/PI3K/AKT pathway upregulated TP53 and inhibited autophagy. The combination was promoting nuclear localization of p53; however, some cytoplasmic signals were also detected. Further increase in the expression of caspase 9 and caspase 3 was observed. Thus, we concluded that the combination of metformin and gedunin upregulates apoptosis by inhibiting the EGFR/PI3K/AKT pathway and autophagy in A549 lung cancer cells.



Combination of Metformin and Gedunin Upregulates AMPKα1, Downregulates HSP90, and Promotes Nuclear Localization of AMPK α1/α2 in A549 Lung Cancer Cells

Current Opinion
Kuttikrishnan et al., (2024) 31(3):89-95

Signaling Networks Guiding Erythropoiesis

Shilpa Kuttikrishnan[a], Kirti S. Prabhu[a], Abdul Q. Khan[a], and **Shahab Uddin**[a,b,c,d]

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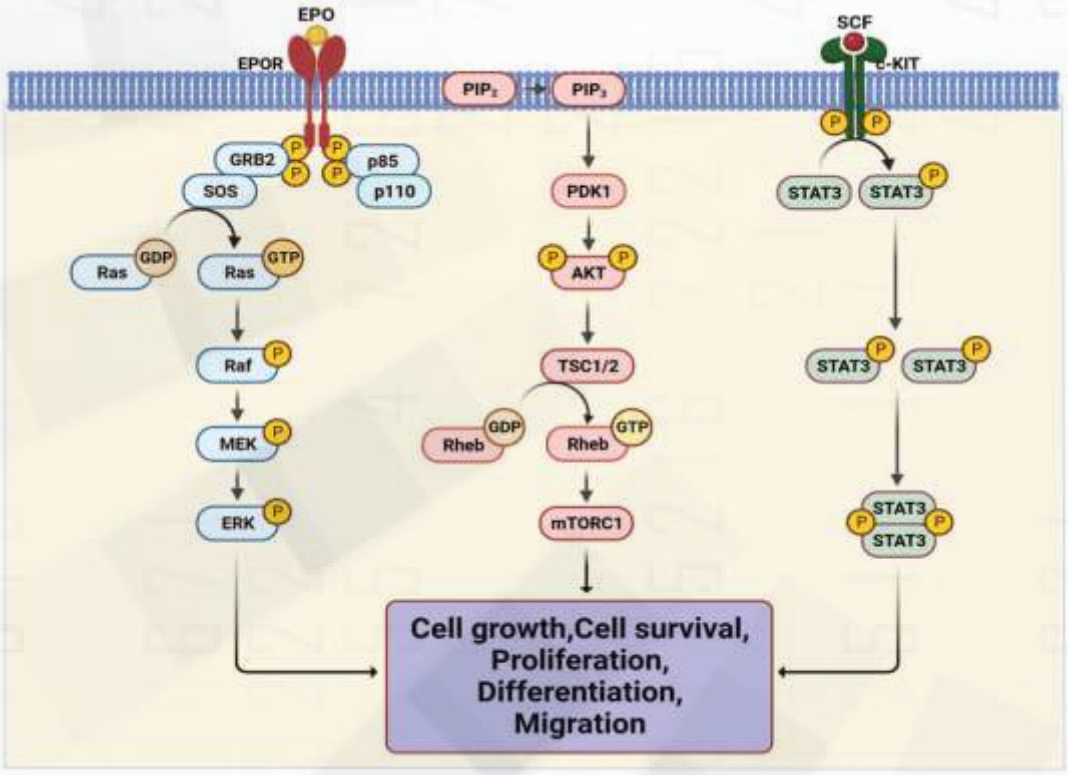
I.F. 3.1

Purpose of review : Cytokine-mediated signaling pathways, including JAK/STAT, PI3K/AKT, and Ras/MAPK pathways, play an important role in the process of erythropoiesis. These pathways are involved in the survival, proliferation, and differentiation function of erythropoiesis.

Recent findings : The JAK/STAT pathway controls erythroid progenitor differentiation, proliferation, and survival. The PI3K/ AKT signaling cascade facilitates erythroid progenitor survival, proliferation, and final differentiation. During erythroid maturation, MAPK, triggered by EPO, suppresses myeloid genes, while PI3K is essential for differentiation. Pro-inflammatory cytokines activate signaling pathways that can alter erythropoiesis like EPOR-triggered signaling, including survival, differentiation, and proliferation.

Summary : A comprehensive understanding of signaling networks is crucial for the formulation of treatment approaches for hematologic disorders. Further investigation is required to fully understand the mechanisms and interactions of these signaling pathways in erythropoiesis.



Activation of intracellular signaling pathways (PI3K/AKT, JAK-STAT and MAPK) by EPO and SCF which results in cell growth, survival, differentiation, proliferation, and migration of erythrocytic progenitors.

Frontiers in Public Health
Khanum et al., (2024) 12:1307592.

Predicting mechanical neck pain intensity in computer professionals using machine learning: identification and correlation of key features

Fatima Khanum[1], Abdur Raheem Khan[1], Ashfaque Khan[1], Aafreen Aafreen[1], Akhlaque Ahmad Khan[2], Ausaf **Ahmad[3], Syed Mohammad Fauzan Akhtar[4],** Omar Farooq[5] et al.

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[2]Department of Electrical Engineering, Integral University, Lucknow, India
[3]Department of Community Medicine, IIMS&R, Integral University, Lucknow, India
[4]IIMSR, IIAHSR, IIANSR, Integral University, Lucknow, India
[5]Department of Electronics Engineering, Aligarh Muslim University, Aligarh, India

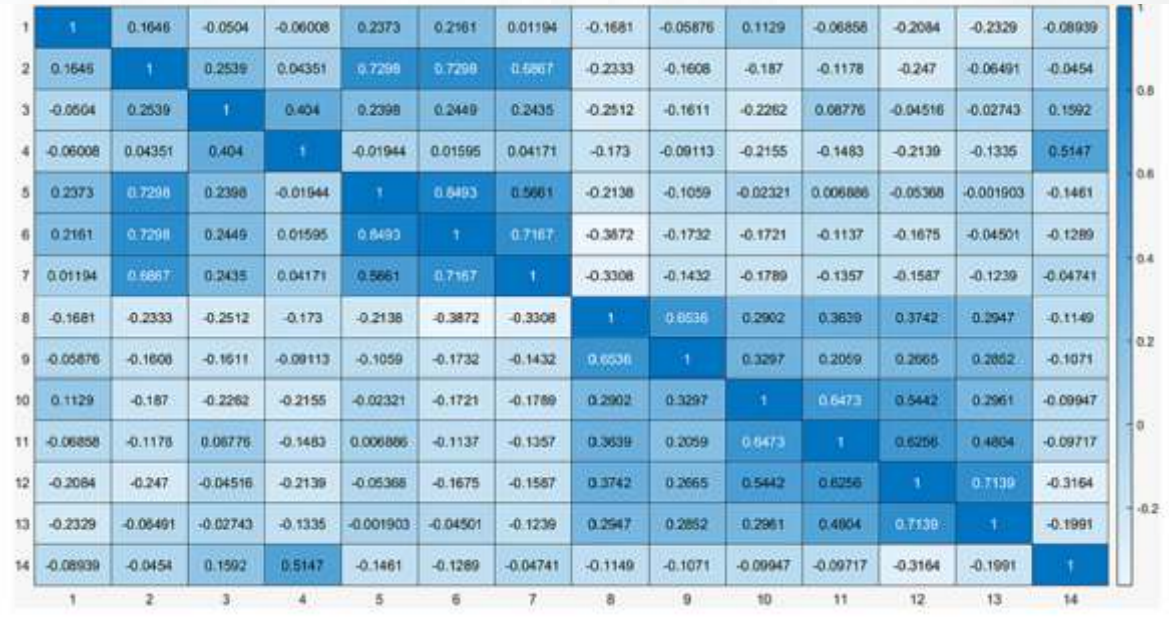
I.F. 3.0

Introduction : Mechanical neck pain has become prevalent among computer professionals possibly because of prolonged computer use. This study aimed to investigate the relationship between neck pain intensity, anthropometric metrics, cervical range of motion, and related disabilities using advanced machine learning techniques.

Method : This study involved 75 computer professionals, comprising 27 men and 48 women, aged between 25 and 44 years, all of whom reported neck pain following extended computer sessions. The study utilized various tools, including the visual analog scale (VAS) for pain measurement, anthropometric tools for body metrics, a Universal Goniometer for cervical ROM, and the Neck Disability Index (NDI). For data analysis, the study employed SPSS (v16.0) for basic statistics and a suite of machine-learning algorithms to discern feature importance. The capability of the kNN algorithm is evaluated using its confusion matrix.

Results: The "NDI Score (%)" consistently emerged as the most significant feature across various algorithms, while metrics like age and computer usage hours varied in their rankings. Anthropometric results, such as BMI and body circumference, did not maintain consistent ranks across algorithms. The confusion matrix notably demonstrated its classification process for different VAS scores (mild, moderate, and severe). The findings indicated that 56% of the pain intensity, as measured by the VAS, could be accurately predicted by the dataset.

Discussion : Machine learning clarifies the system dynamics of neck pain among computer professionals and highlights the need for different algorithms to gain a comprehensive understanding. Such insights pave the way for creating tailored ergonomic solutions and health campaigns for this population.



Relationship between neck pain intensity, anthropometric metrics, cervical range of motion, and related disabilities using advanced machine learning techniques

Journal of Clinical Medicine
Alqhtani et al., (2024) 13(2):475

Efficacy of Core-Strengthening and Intensive Dynamic Back Exercises on Pain, Core Muscle Endurance, and Functional Disability in Patients with Chronic Non-Specific Low Back Pain: A Randomized Comparative Study

Raee Saeed Alqhtani[1], Hashim Ahmed[1], Hussain Saleh H Ghulam[1], Abdullah Mohammed Alyami[1], Yousef Hamad Hassan Al Sharyah[1], Reyaz Ahmed[1], **Ashfaque Khan**[2], **Abdur Raheem Khan**[2]

[1]*Physiotherapy Program, Department of Medical Rehabilitation Sciences, College of Applied Medical Sciences, Najran University, Najran 61441, Saudi Arabia.*
[2]***Department of Physiotherapy, Integral University, Lucknow 226026, India.***

I.F. 3.0

Background: Chronic back pains are progressively disabling working individuals, including 60-80% of the general population, for which their diagnosis is challenging to healthcare workers worldwide, thereby becoming a burden to nations. Purpose: The study aimed to investigate the efficacy of core strengthening exercise (CSE) and intensive dynamic back exercise (IDBE) on pain, core muscle endurance, and functional disability in patients with chronic non-specific low back pain (LBP).

Methods: The study was based on a three-arm parallel-group randomized control design. Forty-five participants with chronic non-specific LBP were recruited and randomly divided into the CSE, IDBE, and Control groups. The CSE and IDBE groups received CSE and IDBE, respectively. However, the Control group received no intervention. Numeric pain rating scale, Oswestry Disability Index, core flexors, extensors, and side bridge tests assessed pain intensity, functional disability, and endurance of core muscles. Outcome scores for the dependent variables were collected at baseline (pre-intervention) and six-week post-intervention. There were no follow-up measurements in this study. A one-way multivariate analysis of covariance (MANCOVA) was used to analyze the intervention effects on the outcomes within groups and between groups, respectively; keeping the significance-level alpha at 95%, i.e., $p < 0.05$. A univariate F-test was performed to observe the superiority of one treatment over another. Pearson's correlation coefficient test was conducted to determine a relation between the dependent variables. In all statistical analyses, the level of significance α was kept at 0.05.

Results: All forty-five out of sixty-three participants with chronic non-specific low back pain (male, 32 and female, 23; average age, 20.24 ± 1.46 years; average pain duration, 19.6 ± 5.42 weeks) completed the study and their data were analyzed. The MANCOVA test showed a significant difference between the treatment groups on the combined multiple endurance tests for the core muscles (flexors, extensors, side bridge tests to the right and left), Visual Analog Scale (VAS), and Oswestry Disability Index (ODI) scores after controlling for baseline scores of all the dependent variables: $F(6, 12) = 23.381$; $p < 0.05$; Wilks' $\Lambda = 0.033$; partial $\eta 2 = 0.819$. A post hoc pair-wise comparison followed by a univariate F-test indicated that a significant improvement was found between the CSE vs. IDBE vs. Control groups on the post-test scores of all the dependent variables except VAS and EET (CSE vs. IDBE only). A Pearson's correlation coefficient test revealed a notable relation between the dependent variables.

Conclusions: The experimental group CSE was found to be more effective than IDBE on improving functional disability, cores' flexors, and side bridges' endurance tests than IDBE. The magnitude of this improvement exceeded the minimal clinically important difference (MCID), suggesting a clinically relevant enhancement in functional disability, core flexors, and side bridge endurance for participants engaged in CSE. However, CSE vs. IDBE revealed non-significant differences on reducing pain and core extensors' endurance. The absence of statistically significant differences suggests that the observed changes did not exceed the established MCID for pain intensity and core extensors' endurance. In addition, partial eta-squared value revealed the superiority of CSE over IDBE and Control groups. This suggests that the observed differences between the two interventions are not only statistically significant, but also clinically relevant, surpassing the established MCID.

Journal of Personalized Medicine
Alqhatani et al., (2023) 13(12):1671

The Association of Psychological Variants with Back Pain, Muscle Endurance, and Functional Limitations in an Individual with Chronic Back Pain

Raee Saeed Alqhtani[1], Hashim Ahmed[1], Adel Alshahrani[1], Abdullah Mohammed Alyami[1], **Abdur Raheem Khan[2], Ashfaque Khan[2]**

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[2]***Department of Physiotherapy, Integral University, Lucknow 226026, India***

I.F. 3.0

Chronic low back pain (CLBP) substantially impacts quality of life through a multifarious interplay of physical and psychological elements. A comprehensive understanding of this relationship is imperative for developing effective treatment strategies. This study recruited 64 participants (35 males and 29 females) experiencing chronic low back pain to explore the associations between psychological factors, muscle endurance, and functional impairments. The study was conducted over six months in an outpatient department and a rehabilitation unit. The study utilized established outcome measures, such as the Biering-Sorensen Test and the Roland Morris Disability Questionnaire, and psychological variants as the core dependent variables, including the Beck Depression Inventory (BDI), STAI questionnaire, the FABQ-PA, and the Pain Catastrophizing Scale (PCS). The findings uncovered pronounced gender disparities, with females exhibiting elevated levels of depression (BDI: 27.68 ± 9.43, $p < 0.001$) and anxiety (STAI: 42.34 ± 8.94, $p < 0.001$) and diminished muscle endurance (130.47 ± 30.56 sec, $p = 0.001$). These revelations are congruent with the prevailing literature, emphasizing the need for gender-sensitive and personalized interventions. Bivariate correlations presented robust associations between psychological distress and decreased muscle endurance (r values ranging from -0.82 to -0.88, $p < 0.001$) alongside elevated functional impairments (r values from 0.89 to 0.94, $p < 0.001$) for both genders. Additionally, linear regression analyses illuminated the consequential impact of specific psychological variables such as the BDI, FABQ-PA, and PCS on muscle endurance and functional impairments (all $p < 0.001$). This study reveals gender-specific variations in chronic back pain, highlighting the influence of psychological factors on pain perception. It underscores the necessity for gender-sensitive treatment strategies. Future research is needed to explore these differences further and assess treatment efficacy to improve care and quality of life for chronic low back pain sufferers through personalized treatment plans.

Turkish Journal of Agriculture and Forestry
Dinesha et al., (2024) 48(3):443-469

Underutilized edible fruit species of the Indo-Gangetic Plains: a systematic review for food security and land degradation neutrality

Dinesha S[1], Rakesh S[2,*], **Deepranjan Sarkar**[3,4], Prakash Kumar JHA[5], Raghupathi Balasani[6], Shikha[7], Saswat Kumar Kar[8,9], et al.

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[5]*Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS, USA*
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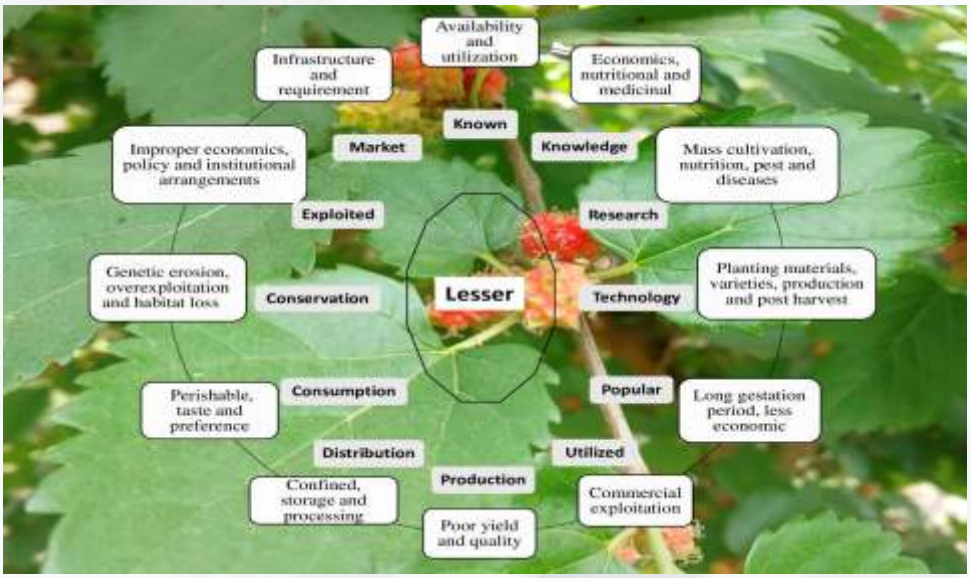
[7]*Krishi Vigyan Kendra, Ranichauri, Veer Chandra Singh Garhwali Uttarakhand University of Horticulture and Forestry, Tehri Garhwal, Uttarakhand, India*
[8]*ICAR-Indian Institute of Soil and Water Conservation, RC, Koraput, India*
[9]*Department of Farm Engineering, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, India*

I.F. 3.0

Many underutilized edible fruit species (UEFS) are found in the Indo-Gangetic Plains (IGP), which support food security (FS) for both indigenous people and other dependent communities. Unfortunately, there is little study and fragmented information available about these naturally edible products. The UEFS of the IGP was the subject of a systematic review utilizing the PRISMA protocol, which produced implications for FS and land degradation neutrality (LDN). This review aims to survey, summarize, and annotate the published information about the angiosperms native and naturalized UEFS of IGP to identify and make use of this species, particularly for the sustainable development of this region. A systematic review confirmed that 371 species of UEFS, of which 62 species were threatened and near threatened (TNT)-UEFS. Among the TNT-UEFS, 41 species were threatened, while 21 species were NT. The threatened species were further categorized as per the International Union for Conservation of Nature (IUCN) Red List in the IGP as vulnerable (21 species), endangered (16 species), and critically endangered (four species). This systematic review suggests integration of the native and naturalized UEFS in afforestation and reforestation programs to aid in various ecosystem services. *Calamus inermis, Corypha taliera*, *Licuala peltata,* and *Saurauia punduana* are examples of multipurpose species that require immediate sustainable conservation and cultivation initiatives to save them from extinction in the near future. Multipurpose species such as *Aegle marmelos*, *Buchanania lanzan*, *Manilkara hexandra*, *Syzygium cuminii*, *Tamarindus indica* are immensely constructive and climate-smart by surviving in harsh agroclimatic conditions and have great potential for establishment on marginal and wastelands throughout the IGP region. These resilient fruit species enhance biodiversity, ecosystems, and landscapes in addition to providing food for humans. It progressively advances India's commitment to LDN, combating climate change, and achieving the UN-SDGs, which call for reducing hunger and raising FS by 2030. As a result, the study will offer baseline data for the next investigations and be helpful to policymakers in creating sustainable and scientific policies for the IGP.



Constraints of UEFS

Multimedia Tools and Applications
Bajpai et al., (2023) 83:26281-26306

Fractional wavelet filter based low memory coding for hyperspectral image sensors

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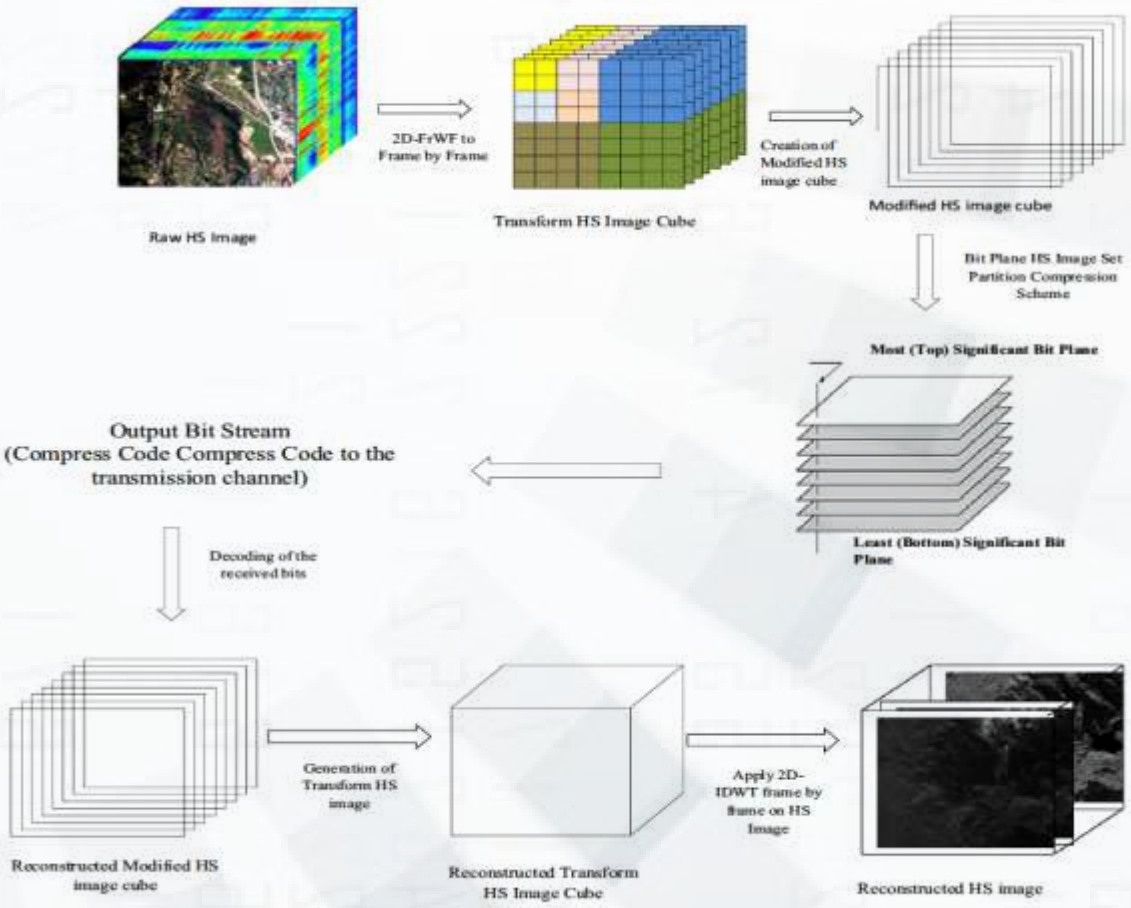
I.F. 3.0

In the present study, a novel low memory coding algorithm for lossless image compression of hyperspectral images is proposed. The hyperspectral images are volumetric images that pose a challenge to the sensor memory. The contemporary transform-based compression algorithms exhibit remarkably efficient performance on the coding gain, complexity, and memory in comparison to other algorithms for lossy compression. The traditional 3D-DWT requires large memory for computation of wavelet coefficients of transform image. The fractional wavelet filter is a low memory solution to calculate the wavelet coefficients of the hyperspectral image. The 2D-ZM-SPECK is employed as a coding algorithm which is applied over HS image frame by frame basis. The simulation results indicate that the proposed compression algorithm has low memory requirements and high coding gain with less computational complexity. On observing the simulation results of the proposed compression algorithm, it is noticeable that the proposed coder is fast enough due to requiring low memory and hence proving its candidature in the implementation of a resource-constrained hyperspectral image sensor.



Simplified proposed HS image compression algorithm

Journal of Personalized Medicine
Shaphe et al., (2023) 13(8):1231

Assessment of Risk Factors and the Relationship between Hypothyroidism with Hypertension in Diabetes Mellitus Patients: A Cross-Sectional Community-Based Study

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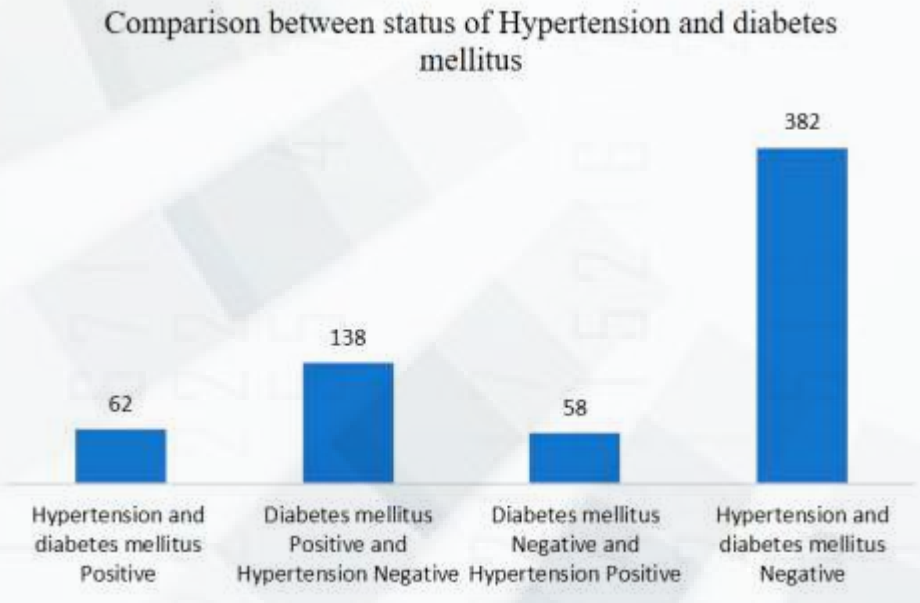
I.F. 3.0

Background: hypertension (HTN) and diabetes mellitus (DM) represent two widely noncommunicable diseases that are prevalent globally, and they often correlate with chronic health issues. There has been an acknowledged connection between diabetes, hypertension, and hypothyroidism for quite some time. However, the extent of thyroid dysfunction among the diabetic population is not uniform and significantly differs across different research studies. This study was conducted with the objective of identifying the risk factors associated with hypothyroidism as well as assessing the relationship between hypothyroidism and hypertension in patients with diabetes.

Materials and Methods: Participants aged 18 years and above were included in this study, while pregnant women were excluded. Trained health professionals measured sociodemographic, behavioural, food practices, and anthropometric information about the participants. Each respondent sought medical advice regarding their health, and a face-to-face interview enabled them to express concern about the likelihood of being diagnosed with diabetes mellitus and hypertension.

Results: The study encompassed 640 participants, with an average age of 49.20 13.0 years. Among these participants, 65.5% were female, and 34.5% were male. Of the total, 31.25% were diagnosed with diabetes mellitus, and 18.75% had hypertension. Interestingly, co-occurrence of both conditions was observed in 9.68% of the population. A comparison of thyroid function and indicators of blood sugar levels yielded consistent results across the different patient groups. Specifically, for diabetes mellitus (DM) patients, the average levels were 3.4 9.8 pg/mL for fT3, 0.9 0.7 ng/dL for fT4, 3.3 6.2 iU/mL for TSH, 153.1 68.0 mg/dL for fasting plasma glucose (FPG), 213.2 97.2 mg/dL for postprandial glucose (PPG), and 8.3 3.2% for HbA1c.

Conclusion : It is concluded that patients with hypertension had a significant prevalence of diabetes mellitus. Subclinical hypothyroid subjects must be frequently screened for hypertension. Of 120 individuals with hypertension, 45 (37.5%) were also diagnosed with diabetes. This co-occurrence was significantly higher in subjects aged over 50 years (26.7%), in the lower socio-economic class (18.5%), and among those who were married (14.7%). Additionally, patients with hypertension exhibited a high prevalence of diabetes across different educational backgrounds and occupations, with the highest prevalence among postgraduates (37.5%) and professionals (24.0%), respectively. These findings highlight the need for an integrated approach to the management of hypertension and diabetes, particularly in high-risk demographics.



Constraints of UEFS

Frontiers in Public Health
Hashim et al., (2024) 12:1327611

An overview of the ameliorative efficacy of Catharanthus roseus extract against Cd2+ toxicity: implications for human health and remediation strategies

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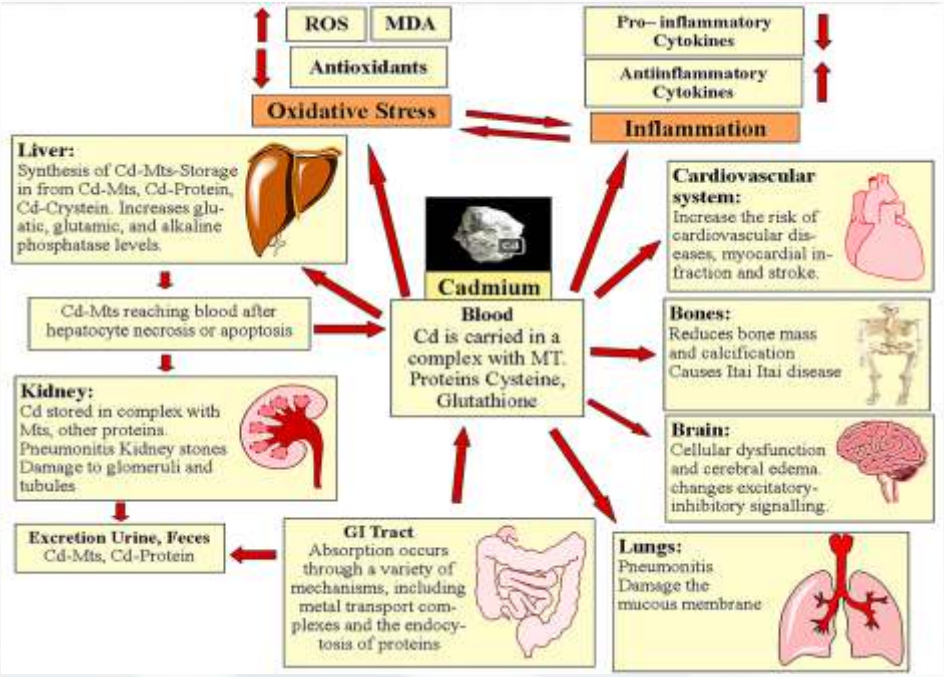
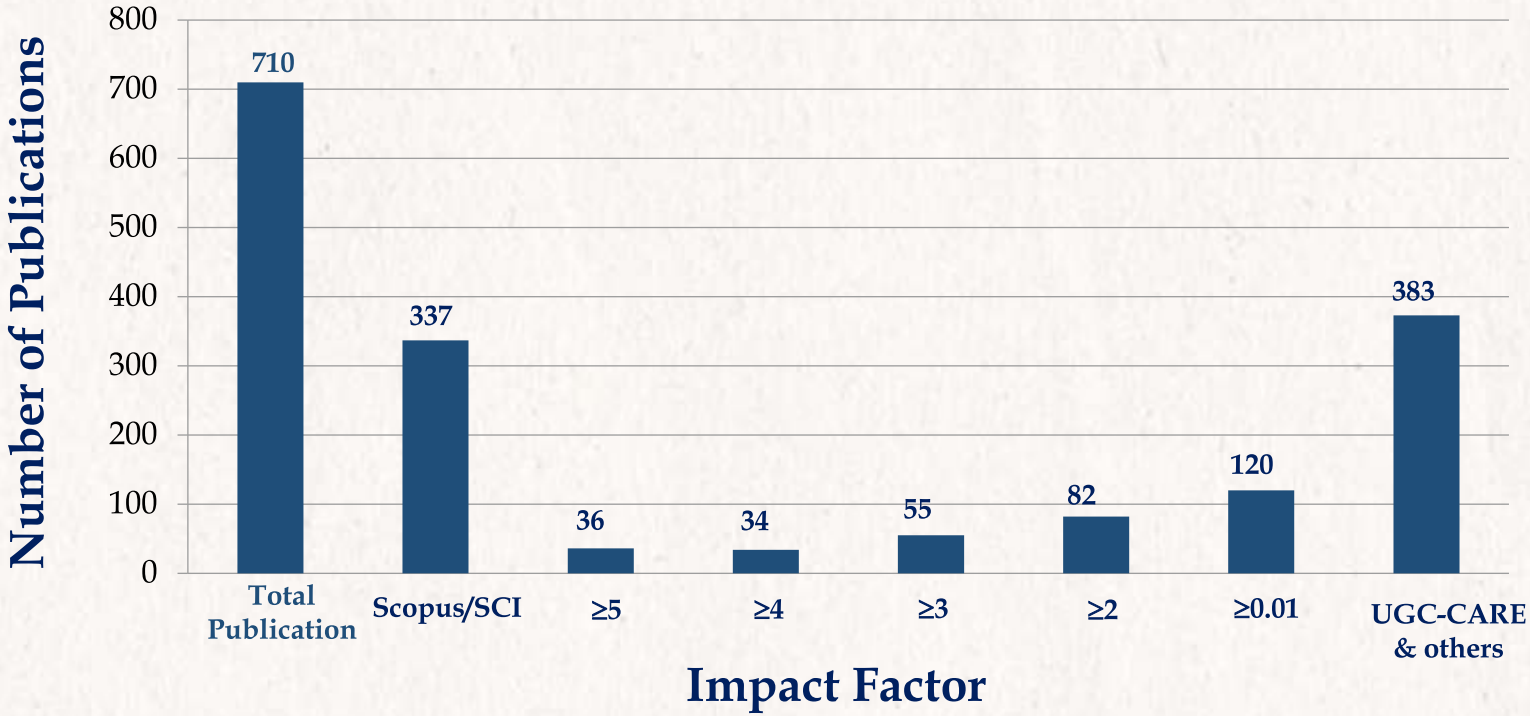
I.F. 3.0

Rapid industrialization has led to an increase in cadmium pollution, a dangerously toxic heavy metal. Cadmium (Cd) is released into the environment through industrial processes and can contaminate air, water, and soil. This pollution poses a significant risk to human health and has become a pressing concern in many industrialized areas. Due to its extended half-life, it leads to a range of health problems, including hepato-nephritic toxicity, brain damage, and degenerative bone disorders. Intoxication alters various intracellular parameters, leading to inflammation, tissue injury, and oxidative stress within cells, which disrupts normal cellular functions and can eventually result in cell death. It has also been linked to the development of bone diseases such as osteoporosis. These adverse effects highlight the urgent need to address cadmium pollution and find effective solutions to mitigate its impact on human health. This article highlights the Cd-induced risks and the role of *Catharanthus roseus* (*C. roseus*) extract as a source of alternative medicine in alleviating the symptoms. Numerous herbal remedies often contain certain bioactive substances, such as polyphenols and alkaloids, which have the power to mitigate these adverse effects by acting as antioxidants and lowering oxidative cell damage. Research conducted in the field of alternative medicine has revealed its enormous potential to meet demands that may be effectively used in safeguarding humans and their environment. The point of this review is to investigate whether *C. roseus* extract, known for its bioactive substances, is being investigated for its potential to mitigate the harmful effects of cadmium on health. Further investigation is needed to fully understand its effectiveness. Moreover, it is important to explore the potential environmental benefits of using *C. roseus* extract to reduce the negative effects of Cd. This review conducted in the field of alternative medicine has revealed its enormous potential to meet demands that could have significant implications for both human health and environmental sustainability.

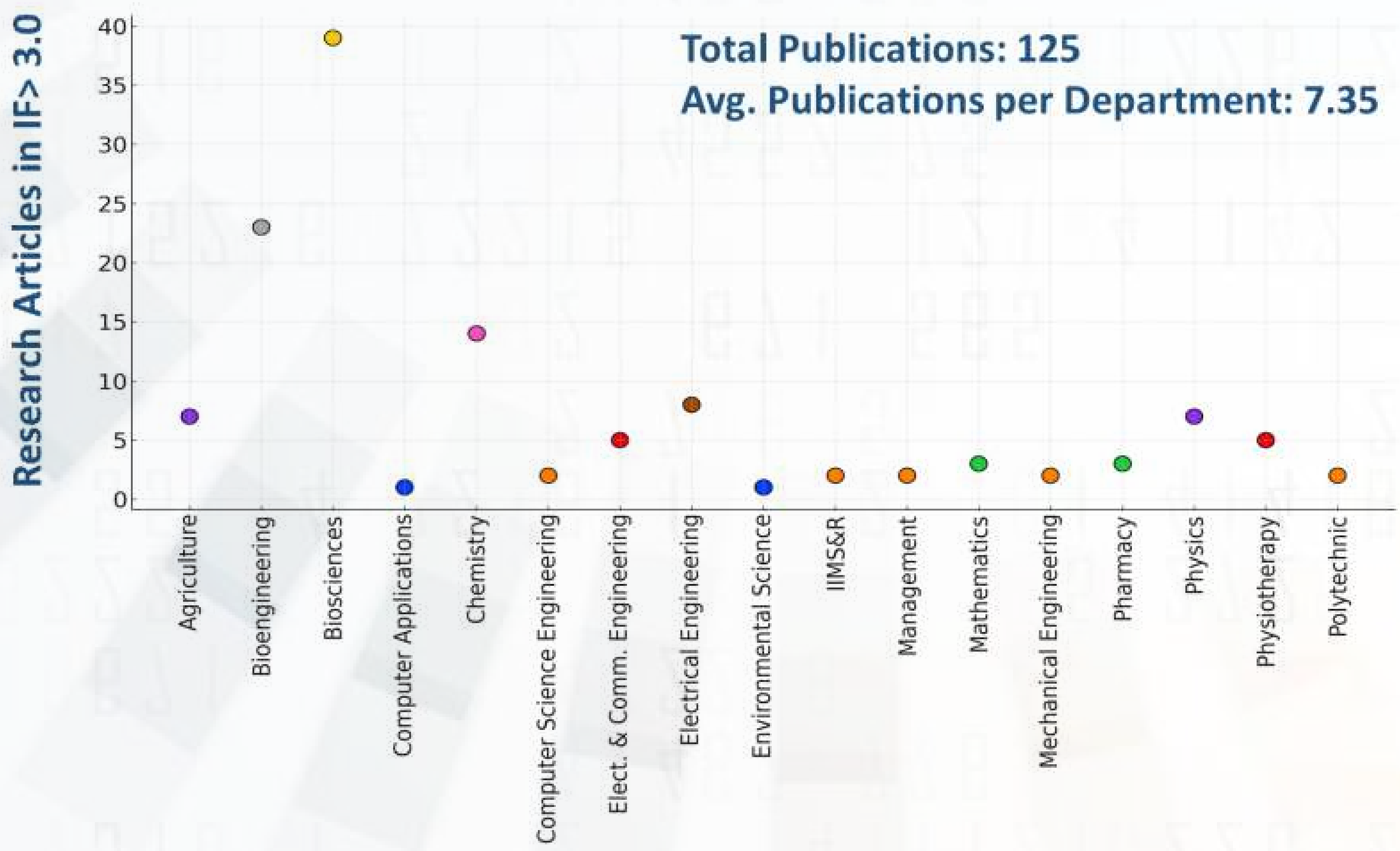


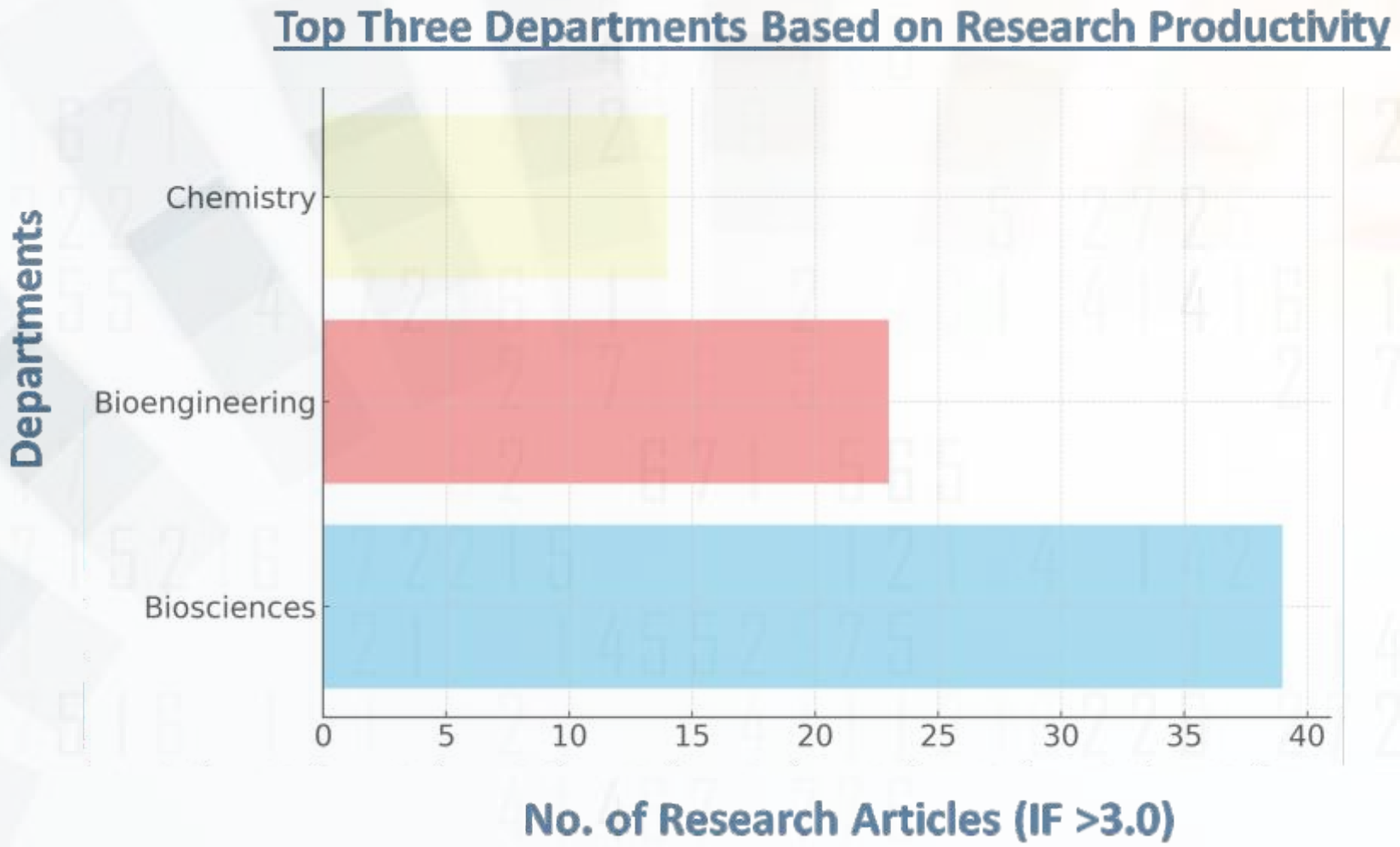
Research Profile

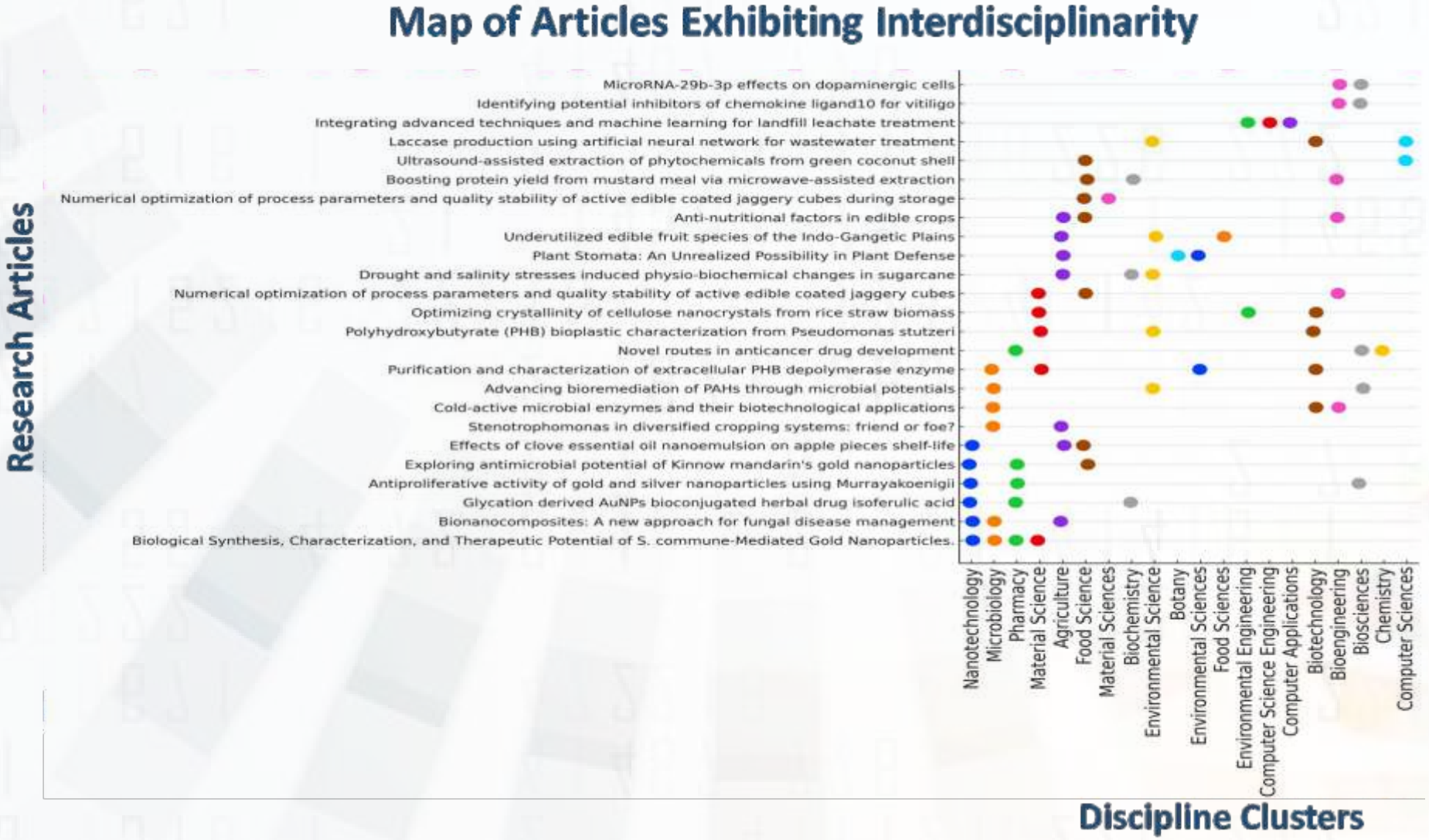
Research Articles (2023-2024)

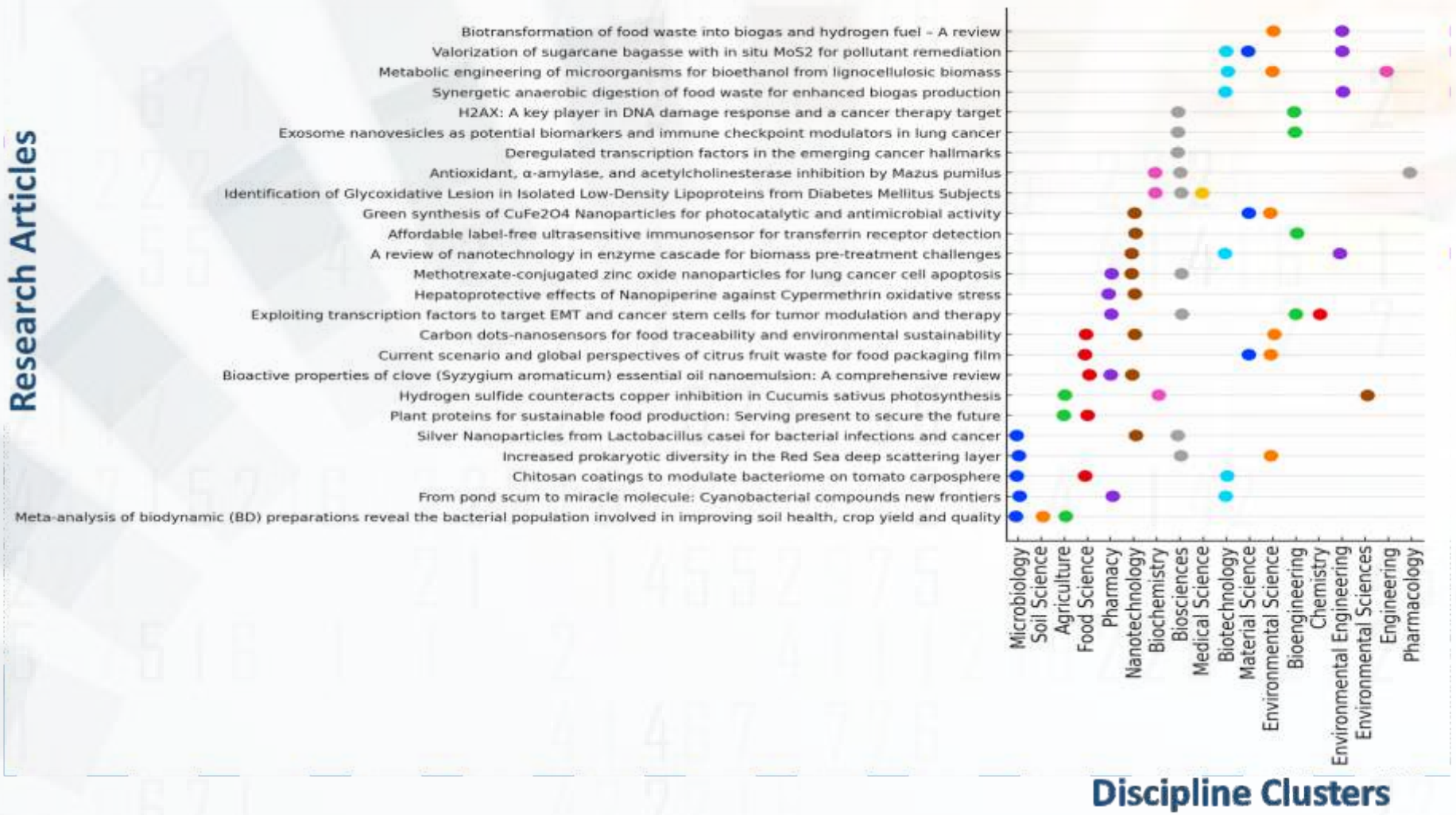


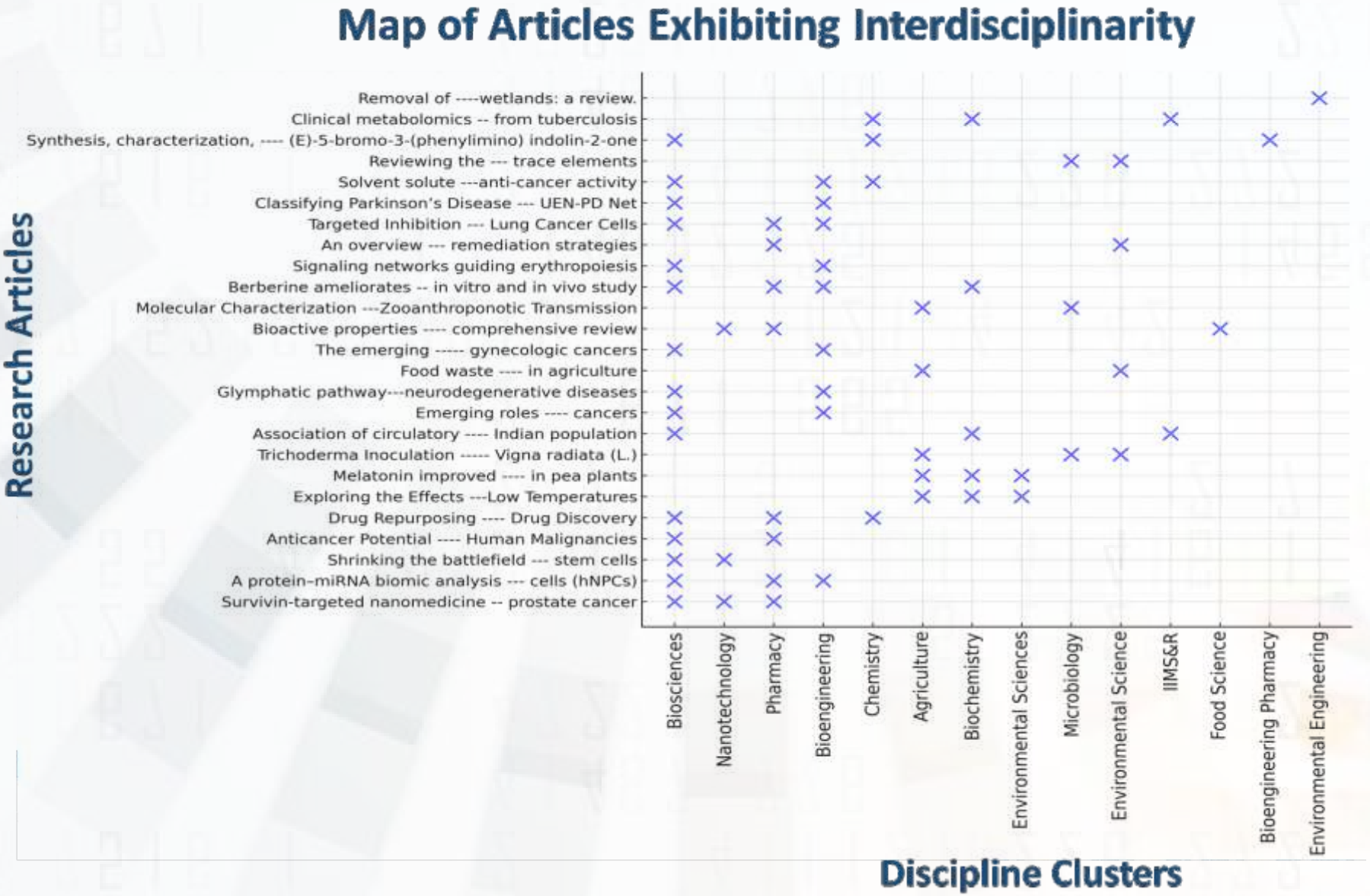
Profile of Departmental Publication in Journals of IF >3.0

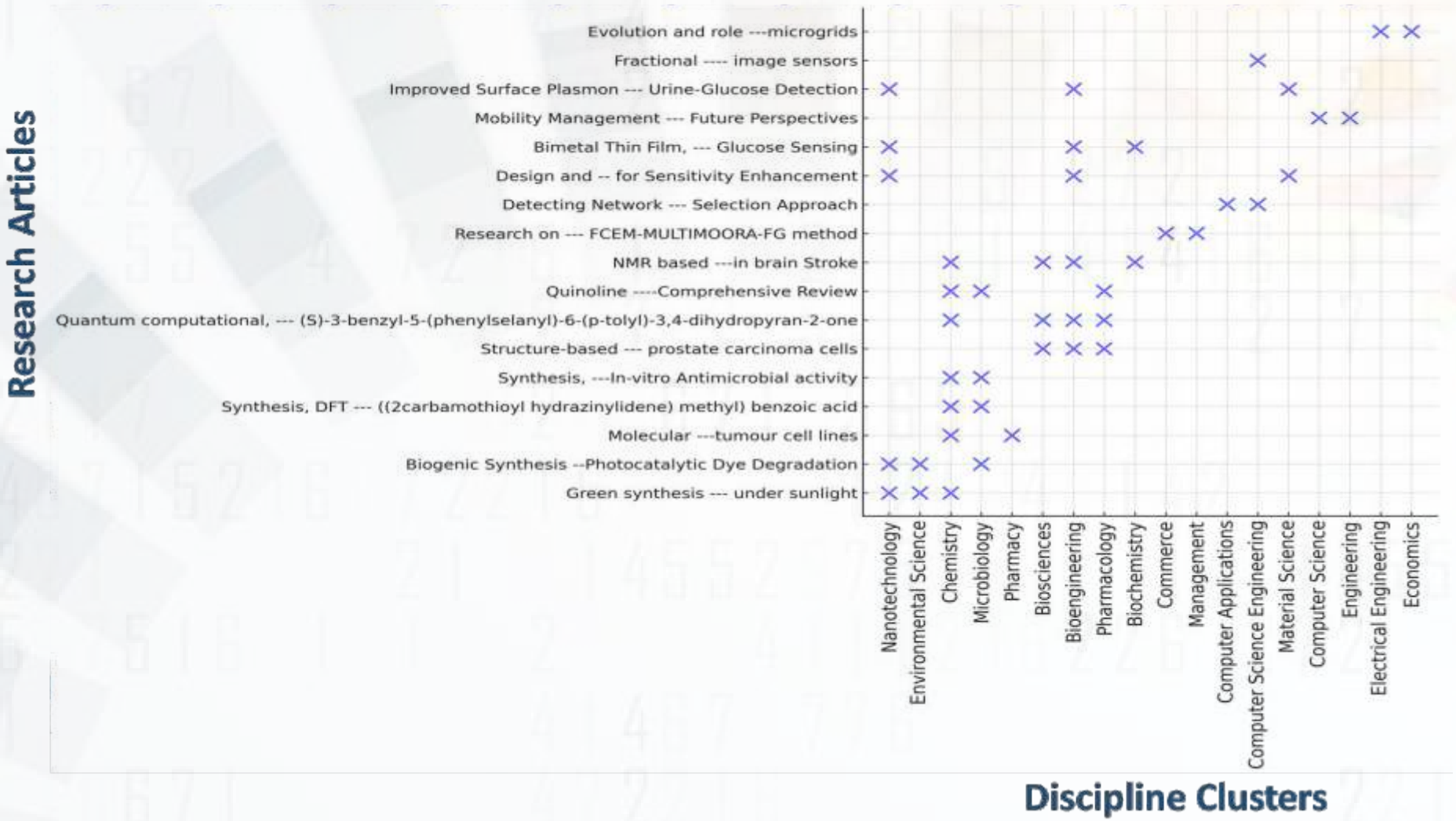


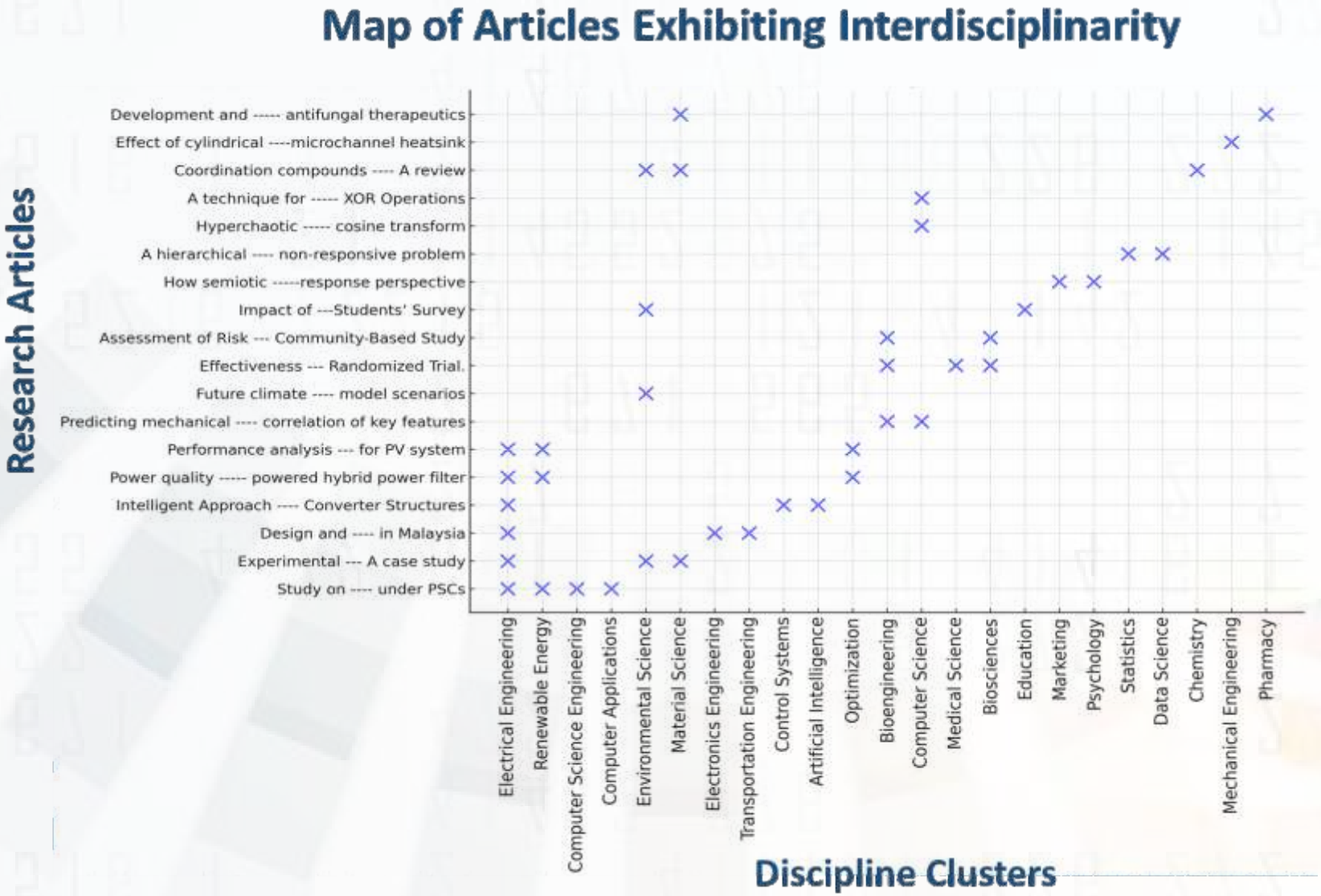

Top Three Departments Based on Research Productivity
Departments
Chemistry
Bioengineering
Biosciences
0
5
10
15
20
25
30
35
40
No. of Research Articles (IF >3.0)

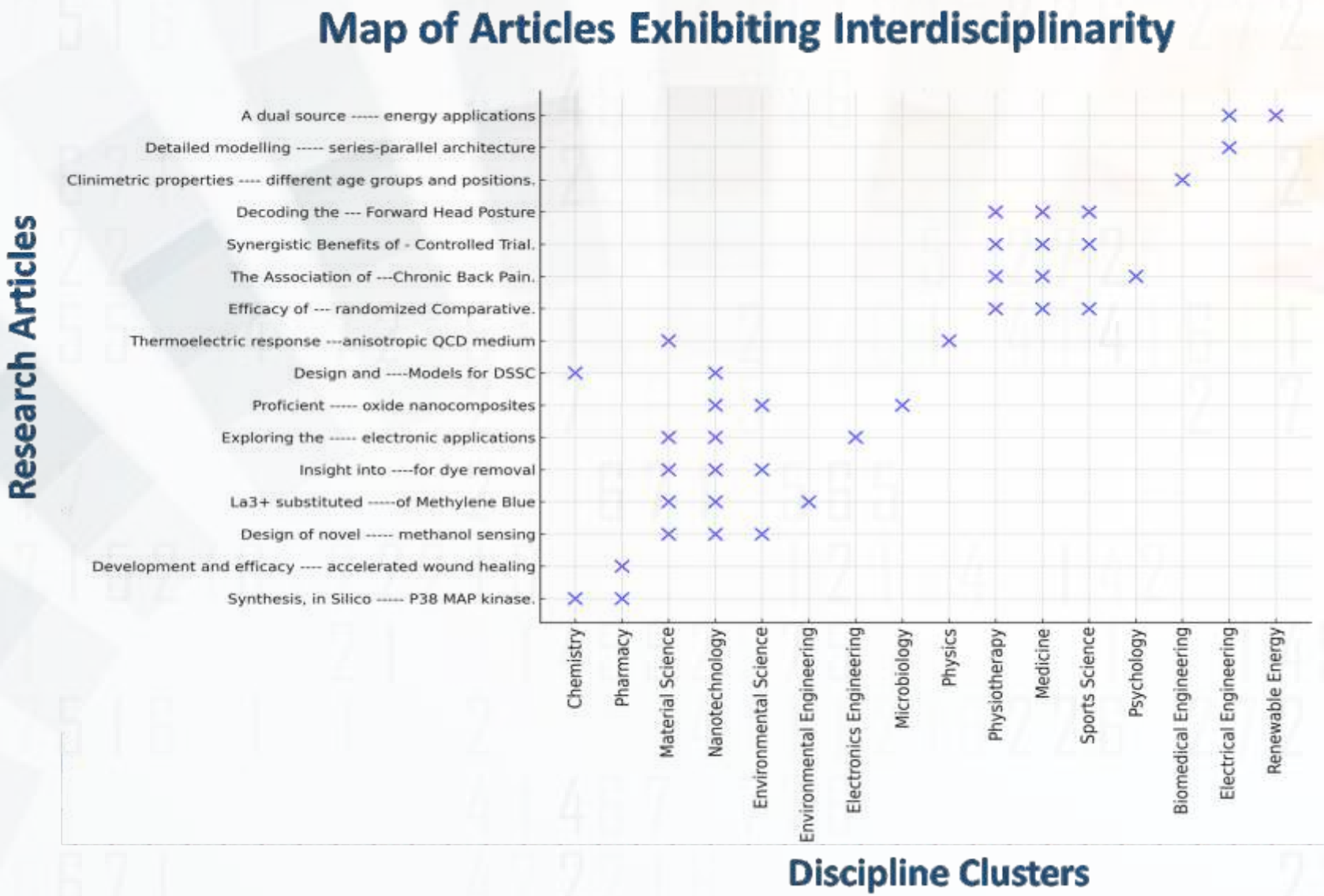

Map of Articles Exhibiting Interdisciplinarity
Research Articles
MicroRNA-29b-3p effects on dopaminergic cells
Identifying potential inhibitors of chemokine ligand10 for vitiligo
Integrating advanced techniques and machine learning for landfill leachate treatment
Laccase production using artificial neural network for wastewater treatment
Ultrasound-assisted extraction of phytochemicals from green coconut shell
Boosting protein yield from mustard meal via microwave-assisted extraction
Numerical optimization of process parameters and quality stability of active edible coated jaggery cubes during storage
Anti-nutritional factors in edible crops
Underutilized edible fruit species of the Indo-Gangetic Plains
Plant Stomata: An Unrealized Possibility in Plant Defense
Drought and salinity stresses induced physio-biochemical changes in sugarcane
Numerical optimization of process parameters and quality stability of active edible coated jaggery cubes
Optimizing crystallinity of cellulose nanocrystals from rice straw biomass
Polyhydroxybutyrate (PHB) bioplastic characterization from Pseudomonas stutzeri
Novel routes in anticancer drug development
Purification and characterization of extracellular PHB depolymerase enzyme
Advancing bioremediation of PAHs through microbial potentials
Cold-active microbial enzymes and their biotechnological applications
Stenotrophomonas in diversified cropping systems: friend or foe?
Effects of clove essential oil nanoemulsion on apple pieces shelf-life
Exploring antimicrobial potential of Kinnow mandarin's gold nanoparticles
Antiproliferative activity of gold and silver nanoparticles using Murrayakoenigii
Glycation derived AuNPs bioconjugated herbal drug isoferulic acid
Bionanocomposites: A new approach for fungal disease management
Biological Synthesis, Characterization, and Therapeutic Potential of S. commune-Mediated Gold Nanoparticles.
Nanotechnology
Microbiology
Pharmacy
Material Science
Agriculture
Food Science
Material Sciences
Biochemistry
Environmental Science
Botany
Environmental Sciences
Food Sciences
Environmental Engineering
Computer Science Engineering
Computer Applications
Biotechnology
Bioengineering
Biosciences
Chemistry
Computer Sciences
Discipline Clusters

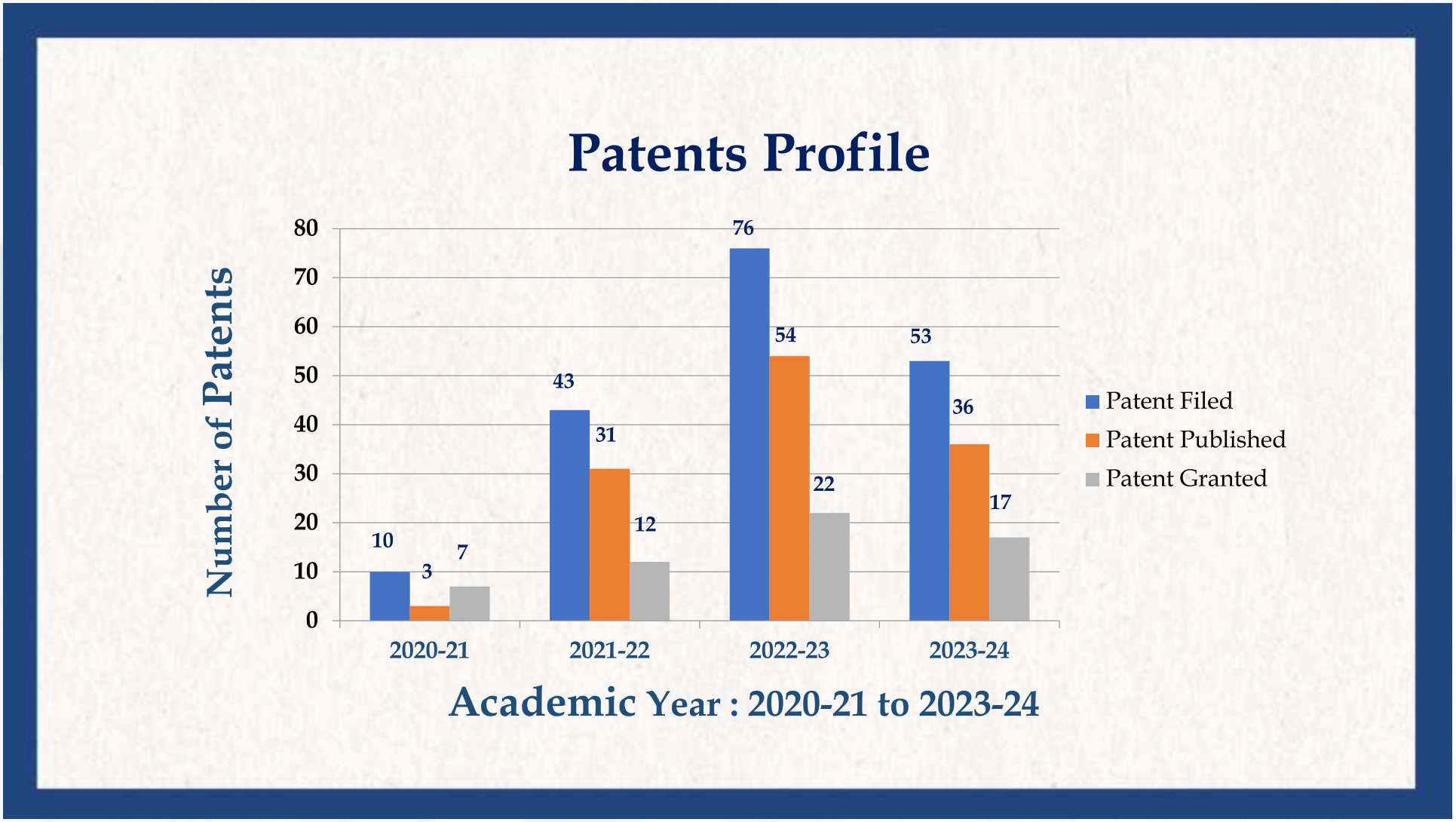

Map of Articles Exhibiting Interdisciplinarity
Research Articles
Biotransformation of food waste into biogas and hydrogen fuel – A review
Valorization of sugarcane bagasse with in situ MoS2 for pollutant remediation
Metabolic engineering of microorganisms for bioethanol from lignocellulosic biomass
Synergetic anaerobic digestion of food waste for enhanced biogas production
H2AX: A key player in DNA damage response and a cancer therapy target
Exosome nanovesicles as potential biomarkers and immune checkpoint modulators in lung cancer
Deregulated transcription factors in the emerging cancer hallmarks
Antioxidant, α-amylase, and acetylcholinesterase inhibition by Mazus pumilus
Identification of Glycoxidative Lesion in Isolated Low-Density Lipoproteins from Diabetes Mellitus Subjects
Green synthesis of CuFe2O4 Nanoparticles for photocatalytic and antimicrobial activity
Affordable label-free ultrasensitive immunosensor for transferrin receptor detection
A review of nanotechnology in enzyme cascade for biomass pre-treatment challenges
Methotrexate-conjugated zinc oxide nanoparticles for lung cancer cell apoptosis
Hepatoprotective effects of Nanopiperine against Cypermethrin oxidative stress
Exploiting transcription factors to target EMT and cancer stem cells for tumor modulation and therapy
Carbon dots-nanosensors for food traceability and environmental sustainability
Current scenario and global perspectives of citrus fruit waste for food packaging film
Bioactive properties of clove (Syzygium aromaticum) essential oil nanoemulsion: A comprehensive review
Hydrogen sulfide counteracts copper inhibition in Cucumis sativus photosynthesis
Plant proteins for sustainable food production: Serving present to secure the future
Silver Nanoparticles from Lactobacillus casei for bacterial infections and cancer
Increased prokaryotic diversity in the Red Sea deep scattering layer
Chitosan coatings to modulate bacteriome on tomato carposphere
From pond scum to miracle molecule: Cyanobacterial compounds new frontiers
Meta-analysis of biodynamic (BD) preparations reveal the bacterial population involved in improving soil health, crop yield and quality
Microbiology
Soil Science
Agriculture
Food Science
Pharmacy
Nanotechnology
Biochemistry
Biosciences
Medical Science
Biotechnology
Material Science
Environmental Science
Bioengineering
Chemistry
Environmental Engineering
Environmental Sciences
Engineering
Pharmacology
Discipline Clusters


Map of Articles Exhibiting Interdisciplinarity
Research Articles
Removal of ----wetlands: a review.
Clinical metabolomics -- from tuberculosis
Synthesis, characterization, ---- (E)-5-bromo-3-(phenylimino) indolin-2-one
Reviewing the --- trace elements
Solvent solute ---anti-cancer activity
Classifying Parkinson's Disease --- UEN-PD Net
Targeted Inhibition --- Lung Cancer Cells
An overview --- remediation strategies
Signaling networks guiding erythropoiesis
Berberine ameliorates -- in vitro and in vivo study
Molecular Characterization ---Zooanthroponotic Transmission
Bioactive properties ---- comprehensive review
The emerging ----- gynecologic cancers
Food waste ---- in agriculture
Glymphatic pathway---neurodegenerative diseases
Emerging roles ---- cancers
Association of circulatory ---- Indian population
Trichoderma Inoculation ----- Vigna radiata (L.)
Melatonin improved ---- in pea plants
Exploring the Effects ---Low Temperatures
Drug Repurposing ---- Drug Discovery
Anticancer Potential ---- Human Malignancies
Shrinking the battlefield --- stem cells
A protein–miRNA biomic analysis --- cells (hNPCs)
Survivin-targeted nanomedicine -- prostate cancer
Biosciences
Nanotechnology
Pharmacy
Bioengineering
Chemistry
Agriculture
Biochemistry
Environmental Sciences
Microbiology
Environmental Science
IIMS&R
Food Science
Bioengineering Pharmacy
Environmental Engineering
Discipline Clusters


Map of Articles Exhibiting Interdisciplinarity
Research Articles
Evolution and role ---microgrids
Fractional ---- image sensors
Improved Surface Plasmon --- Urine-Glucose Detection
Mobility Management --- Future Perspectives
Bimetal Thin Film, --- Glucose Sensing
Design and -- for Sensitivity Enhancement
Detecting Network --- Selection Approach
Research on --- FCEM-MULTIMOORA-FG method
NMR based ---in brain Stroke
Quinoline ----Comprehensive Review
Quantum computational, --- (S)-3-benzyl-5-(phenylselanyl)-6-(p-tolyl)-3,4-dihydropyran-2-one
Structure-based --- prostate carcinoma cells
Synthesis, ---In-vitro Antimicrobial activity
Synthesis, DFT --- ((2carbamothioyl hydrazinylidene) methyl) benzoic acid
Molecular ---tumour cell lines
Biogenic Synthesis --Photocatalytic Dye Degradation
Green synthesis --- under sunlight
Nanotechnology
Environmental Science
Chemistry
Microbiology
Pharmacy
Biosciences
Bioengineering
Pharmacology
Biochemistry
Commerce
Management
Computer Applications
Computer Science Engineering
Material Science
Computer Science
Engineering
Electrical Engineering
Economics
Discipline Clusters


Map of Articles Exhibiting Interdisciplinarity
Research Articles
Development and ----- antifungal therapeutics
Effect of cylindrical ----microchannel heatsink
Coordination compounds ---- A review
A technique for ----- XOR Operations
Hyperchaotic ----- cosine transform
A hierarchical ---- non-responsive problem
How semiotic -----response perspective
Impact of ---Students' Survey
Assessment of Risk --- Community-Based Study
Effectiveness --- Randomized Trial.
Future climate ---- model scenarios
Predicting mechanical ---- correlation of key features
Performance analysis --- for PV system
Power quality ----- powered hybrid power filter
Intelligent Approach ---- Converter Structures
Design and ---- in Malaysia
Experimental --- A case study
Study on ---- under PSCs
Electrical Engineering
Renewable Energy
Computer Science Engineering
Computer Applications
Environmental Science
Material Science
Electronics Engineering
Transportation Engineering
Control Systems
Artificial Intelligence
Optimization
Bioengineering
Computer Science
Medical Science
Biosciences
Education
Marketing
Psychology
Statistics
Data Science
Chemistry
Mechanical Engineering
Pharmacy
Discipline Clusters


Map of Articles Exhibiting Interdisciplinarity
Research Articles
A dual source ----- energy applications
Detailed modelling ----- series-parallel architecture
Clinimetric properties ---- different age groups and positions.
Decoding the --- Forward Head Posture
Synergistic Benefits of - Controlled Trial.
The Association of ---Chronic Back Pain.
Efficacy of --- randomized Comparative.
Thermoelectric response ---anisotropic QCD medium
Design and ----Models for DSSC
Proficient ----- oxide nanocomposites
Exploring the ----- electronic applications
Insight into ----for dye removal
La3+ substituted -----of Methylene Blue
Design of novel ----- methanol sensing
Development and efficacy ---- accelerated wound healing
Synthesis, in Silico ----- P38 MAP kinase.
Chemistry
Pharmacy
Material Science
Nanotechnology
Environmental Science
Environmental Engineering
Electronics Engineering
Microbiology
Physics
Physiotherapy
Medicine
Sports Science
Psychology
Biomedical Engineering
Electrical Engineering
Renewable Energy
Discipline Clusters


Patents Profile
Number of Patents
80
70
60
50
40
30
20
10
0
10
3
7
43
31
12
76
54
22
53
36
17
2020-21
2021-22
2022-23
2023-24
Patent Filed
Patent Published
Patent Granted
Academic Year : 2020-21 to 2023-24

Acknowledgement:

The Annual Research Compendium reflects the collective research efforts and productivity of Integral University, capturing the innovative spirit and scholarly achievements of our academic community. Sincere gratitude to the Hon'ble Chancellor, Prof. Syed S.W. Akhtar, and the Pro-Chancellor, Dr. Syed Nadeem Akhtar, for their unwavering support and for approving the proposal moved by the Hon'ble Vice-Chancellor. The sanction of a generous grant of Rs12.89 crores from the University budget has been instrumental in developing the Integral Centre for Interdisciplinary Research (ICEIR) and augmenting the Central Instrumentation Facility (CIF). The establishment of ICEIR and the modernization of CIF are the outcomes of the research initiative of the Hon'ble Vice-Chancellor, Prof. Javed Musarrat whose commitment to fostering a robust research environment has laid the foundation for these significant advancements in research and innovation. His efforts in formulating the framework for this Research Compendium have been instrumental in bringing this initiative to fruition. The Services of Dr. Andleeb Khan, Associate Professor of Biosciences, and Dr. Mohammad Rumman, Assistant Professor of Biosciences, and the dedicated support provided by the staff of the Vice Chancellor's Secretariat, ensuring the seamless development of this compendium is duly acknowledged. This compendium stands as a testament to the university's commitment to advancing research and innovation, reflecting the collective efforts of the university leadership, faculty, and staff in fostering a vibrant research culture and achieving new milestones in academic excellence.

INTEGRAL UNIVERSITY
LUCKNOW - INDIA

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