THIRD INTERNATIONAL CONFERENCE ON
EMERGING TRENDS IN BASIC AND APPLIED SCIENCES (ETBAS-2026)

ETBAS-2026

ORGANIZED BY:

SHRI MOUNI VIDYAPEETH'S

KARMAVEER HIRE ARTS, SCIENCE, COMMERCE AND EDUCATION COLLEGE,

GARGOTI, TAL - BHUDARGAD,

DIST - KOLHAPUR, M.S. INDIA 416 209

January 5, 2026

Abstract Book

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Hon. Satej Alias Bunty D. Patil
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Phone No.: 02324 - 220011 (O)

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Message

I am very happy to know that the Karmaveer Hire College, Gargoti is organizing Third international conference on 'Emerging Trends in Basic and Applied Sciences (ETBAS-2026)' on 5th January, 2026. On this occasion a large number of students and academicians are going to exchange their thoughts and ideas with international scientists and experts in research areas.

As a president of Shri Mouni Vidyapeeth Gargoti, I extend my best wishes and felicitations to the organizers and the participating delegates from India and abroad and wish the conference grand success.

(Satej Patil)

Hon. Madhukar K. Desai
Chairman,
Shri. Mouni Vidyapeeth,
Muralidharnagar, Gargoti,
Tal - Bhudargad, Dist – Kolhapur 416 209
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Message

It gives me an immense pleasure to know that the Karmaveer Hire College, Gargoti is organizing Third international conference on 'Emerging Trends in Basic and Applied Sciences (ETBAS-2026)' on 5th January, 2026.

I am sure that the theme of the conference will provide a meaningful platform for the students and all the participants to exchange their experiences and knowledge.

As a chairman of Shri. Mouni Vidyapeeth, Gargoti, I wish the conference all success.

(Madhukar K. Desai)

Hon. Prin. Dr. P. B. Patil
Director,
Shri. Mouni Vidyapeeth,
Muralidharnagar, Gargoti,
Tal - Bhudargad, Dist – Kolhapur 416 209
(M.S.) INDIA

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Message

On behalf of Shri Mouni Vidyapeeth, I extend a very warm welcome to all the delegates and participants for the Third international conference on 'Emerging Trends in Basic and Applied Sciences (ETBAS-2026)' on 5th January, 2026.

The Conference aims to bring different ideologies under one roof and provide opportunities to exchange ideas face to face, to establish research relations and to find global partners for future collaboration. The themes and sub-themes for this conference are indicative of relevant research areas to give the prospective authors innovative prepositions about the ambit of discussion.

As a Director of Shri. Mouni Vidyapeeth, Gargoti, I wish the conference all success.

(Prin. P. B. Patil)

SHRI MOUNI VIDYAPEETH, GARGOTI
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Principal: Prof. (Dr.) U. R. Shinde
M.Com., M.Phil, Ph.D.

It gives me immense pleasure to extend a warm welcome to all delegates, academicians, researchers, scientists, and students to the **Third International Conference on "Emerging Trends in Basic and Applied Sciences (ETBAS–2026)"**, scheduled to be held on **5th January, 2026**.

In today's era of rapid scientific and technological progress, basic and applied sciences play a crucial role in addressing global challenges related to health, environment, agriculture, industry, and sustainable development. ETBAS–2026 serves as an important international platform for the exchange of innovative ideas, presentation of research outcomes, and promotion of interdisciplinary approaches that effectively connect fundamental science with practical applications.

The conference aims to promote academic excellence, strengthen collaborative research, and motivate young researchers to pursue scientific inquiry with creativity and social responsibility. I sincerely acknowledge the dedicated efforts of the organizing committee, advisory board, and volunteers for their commitment in making this event successful.

I wish the conference great success and hope all participants have a rewarding and memorable academic experience.

(Prin. U. R. Shinde)

ABSTRACTS

ASSESSMENT OF MORPHOLOGICAL, PHYTOCHEMICAL, AND NUTRITIONAL PROFILING OF TWO UNDERUTILIZED LEAFY VEGETABLES *BASELLA SP.*

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Abstract

Green leafy vegetables are recognised to be a great source of several vital nutrients. *Basella* belongs to the family Basellaceae, commonly referred to as Indian spinach, Malabar Spinach, Ceylon Spinach, country Spinach, wine Spinach, and commonly known as Poi in Odia. It is native to Africa and Asia and it is widely cultivated in tropical and sub-tropical areas where it is used as vegetables. In the present study, morphological characterisation, phytochemical screening and nutritional contents of *Basella alba* L and *Basella rubra* L were analysed. The preliminary phytochemical screening of methanolic leaf extracts confirms the presence of carbohydrate, protein, glycosides, alkaloids, and tannin. Selected plants showed comparatively higher nutritional and vitamin content than commonly used leafy vegetables. Propagation and consumption of such valuable vegetables help to improve healthcare and should be included in our dietary menu.

Keywords: Morphological, Phytochemical, Nutritional, Underutilized, *Basella alba* L., and *Basella rubra* L.,

TOXICITY ASSESSMENT OF SELECTED CYANOBACTERIA

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Abstract:

Cyanobacteria are photosynthetic microorganisms known for their ability to produce toxic secondary metabolites that can adversely affect aquatic ecosystems and public health. The present study assesses the toxic potential of selected freshwater cyanobacteria, namely *Nostoc*, *Microcystis*, and *Oscillatoria* species. Isolates were collected from freshwater habitats and cultured under controlled laboratory conditions. Toxicity screening was carried out using standard analytical methods to detect cyanotoxin-producing strains. The results demonstrated clear species-specific variation in toxic potential, with differences observed in the intensity and presence of toxin production among the studied cyanobacteria. The study highlights the ecological importance of monitoring toxic cyanobacteria and provides valuable insights into their potential environmental impacts.

Keywords: Cyanobacteria; Cyanotoxins; *Nostoc*; *Microcystis*; *Oscillatoria*; Aquatic Ecosystems; Public Health.

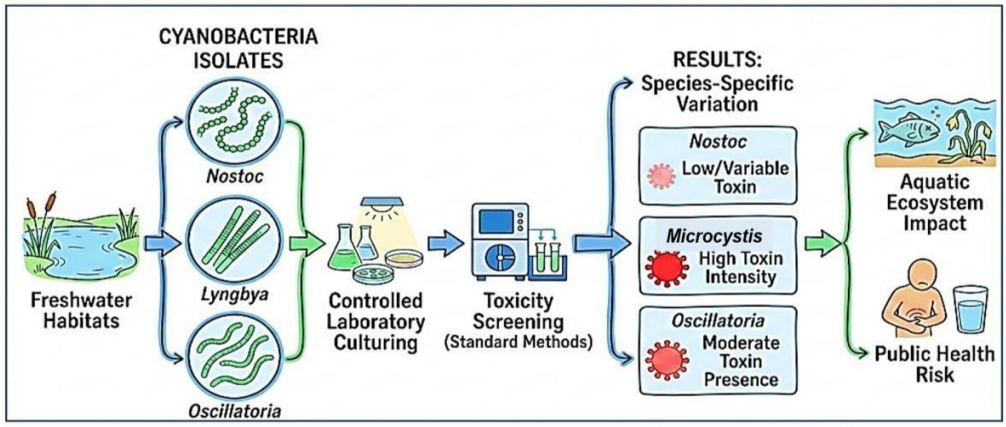

Fig. 1: Cyanobacteria Toxicity assessments process and findings.

FLORISTIC DIVERSITY AND PHYTOSOCIOLOGY OF SOME PART OF RADHANAGARI AREA (MH)

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Abstract:

The present study was carried out in the Sarawade area of More College Campus, Radhanagari taluka, Kolhapur district, Maharashtra, in the Western Ghats, with the aim of describing the phytosociological status of the campus flora in relation to species composition, dominance and diversity under continuous human use. Phytosociological surveys were conducted from November to December 2025 at seven sites that differed in their physical and biotic features, using 7 quadrats of 2 m × 2 m laid randomly within the campus. In total, 54 plant species and 28 different family, including herbs, grasses, shrubs, climbers and trees, were recorded and analysed using standard quantitative parameters such as density, frequency, abundance, basal area, relative density, relative frequency, relative dominance and importance value index (IVI). Cynodon dactylon, Parthenium hysterophorus, Setaria verticillata, Chromolaena odorata, Bidens pilosa, Alternanthera sessilis and other ruderal species attained high values of density and IVI, showing clear dominance in disturbed ground-level habitats. Woody species such as Mangifera indica, Cocos nucifera, Monoon longifolium, Juniperus virginiana, Ricinus communis and Hibiscus rosa-sinensis contributed most of the basal area and relative dominance and thus played a key structural role in the community. Overall, the campus vegetation appears as a mixture of planted ornamentals and a dense cover of common weeds, and the strong presence of invasive and ruderal species reflects considerable anthropogenic pressure and underlines the need for suitable management and conservation action.

Keywords: Biodiversity; Phytosociology, Frequency, Density, Abundance, RD, RF, IVI Western Ghats.

COPPER DOPED COBALT OXIDE AN EFFICIENT CATALYST FOR PHOTODEGRADATION OF MERHYLENE BLUE (MB)

Prajkta A. Gholap[1], Pooja B. Dhole[2], Damodar J. Sutar[2], Asmita S. Tapase[2], Rajkumar S. Pandav[1], Nivas M. Patil[3*]

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Abstract:

Water pollution is burning issue in last two decade. Spinel type mixed oxide due to their versatile structural magnetic and electrical properties shows considerable attention for degradation of organic pollutants mixed in water body. In this paper we report polyol method for synthesis of copper substituted cobalt oxide for photocatalytic activity. The prepared mixed oxide material was characterized by various techniques like XRD (X-ray Diffraction), FTIR (Fourier transformation infrared Radiation), SEM (Scanning Electron Microscopy), TEM-EDS (transmission Electron Microscopy), XPS (X-Ray Photoelectron Spectroscopy). XRD result confirmed the formation of cubic crystal structure with nanoscale crystallite size. XPS study signified the presence of copper and cobalt in different oxidation state. FTIR spectrum revealed the presence of band at 574 Cm-1 and 656 Cm^{-1} deigned the characteristic of Cu-O and Co-O. SEM analysis reveals a highly agglomerated composed of irregular shaped nanoparticles forming micron-sized clusters. The particles exhibit a rough and porous surface morphology with quasispherical agglomerates. The synthesized metal oxide tested by solution of methylene blue dye (MB) under sunlight. The result shows degradation efficiency (50%) reached. These revels that the synthesized copper doped cobalt oxide efficient material for degradation of organic pollutants.

FORMATION OF ORGANOCHALCOGENES: SYNTHESIS, CHARACTERIZATION, ELECTROCHEMICAL INVESTIGATIONS AND ANTIOXIDANT ACTIVITY

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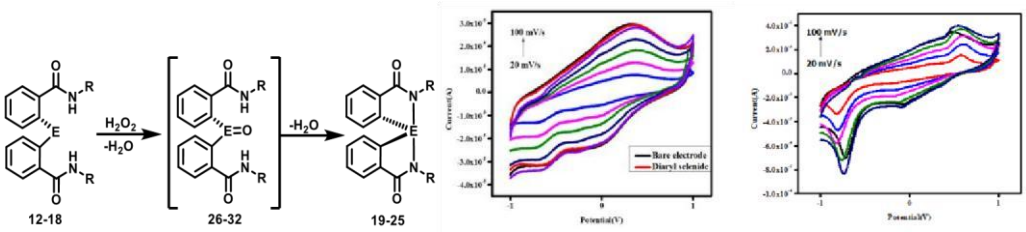
Abstract:

Spirodiazaselenuranes are structurally interesting compounds, whose stability highly depends on the nature of the substituents attached to the nitrogen atoms. Aromatic substituents are known to play important roles in stabilizing the Se-N bonds in spiro compounds. In this study, several amino acid substituted spirodiazaselenuranes are synthesized by introducing amino acids substituents to understand their effect on the stability of the Se-N bonds and the antioxidant activity. As per our previous studies aromatic and benzyl shows significant activity. Herein, the replacement of aromatic, benzyl substituent by amino acids shows interesting antioxidant activity.



Figu-1 Synthesis of Spirodiazaselenuranes and pproposed mechanism for the catalytic cycle of GPx. Effect of scanning rate on the electrochemical response of diaryl selenides (Phe) & (Tyr) by using cyclic voltammograms response with modified GC electrode under various scan rate. Comparison of the glutathione peroxidase (GPx) mimetic activity of the compounds showed that the diaryl selenides having amino acids, with phenyl and heterocyclic rings are significantly more active due to the facile oxidation of the selenium/sulfur centre. However, the activity is reduced significantly for compounds having aliphatic amino acid substituents. In addition to GPx activity, cyclic voltammetric studies of selected diaryl selenides and corresponding spirodiazaselenuranes are discussed. The experimental observations suggest that the cyclic voltammetric studies show redox systems to be quasi-reversible involving electronic transfer.

Keywords: Glutathione Peroxidase (GPx), Selenium, Antioxidants, Peroxinitrite Oxidation, Spirodiazaselenuranes.

NATURAL PRODUCTS TO NANOCARBONS: EMERGING TRENDS IN MOLECULAR AND MATERIALS SCIENCE

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Abstract

Natural products have long served as a cornerstone of molecular science, offering structurally diverse and biologically active frameworks that inspire innovation across chemistry, biology, and materials science. In recent years, the convergence of natural product chemistry with advanced materials research has opened new pathways toward the design and development of functional nanomaterials, particularly nanocarbons. This review article explores the evolving transition from nature-derived molecules to carbon-based nanostructures, highlighting emerging trends that bridge fundamental molecular understanding with applied materials science.

The article provides a comprehensive overview of natural products as precursors, templates, and functional modifiers in the synthesis of nanocarbons such as graphene, carbon nanotubes, carbon dots, and related hybrid materials. Emphasis is placed on green and sustainable synthetic strategies, including biomass-derived carbon sources and bio-inspired approaches, which align with current global priorities in sustainable science and technology. The role of molecular structure, functional group diversity, and self-assembly behavior of natural compounds in tailoring the physicochemical properties of nanocarbons is critically discussed.

Furthermore, the review also surveys key applications of natural product–derived nanocarbons in energy storage, catalysis, environmental remediation, sensing, and biomedical fields, underscoring their relevance in both basic and applied sciences.

By integrating insights from molecular chemistry and materials engineering, this review aims to provide a unified perspective on the emerging trends shaping the future of nanocarbon research. It highlights current challenges, opportunities, and future directions, offering valuable guidance for researchers working at the interface of natural products and advanced functional materials.

Keywords: Natural Products, Nanocarbons, Molecular and Materials Science, Sustainable Synthesis, Advanced Functional Materials

ECO-FRIENDLY WATERBORNE (PUDS) COATINGS FROM NON-EDIBLE OIL.

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Abstract:

The vegetable oil based waterborne polyurethane coatings have gained significant interest due to low volatile organic compounds (VOCs) and hence this has been considered as a proper substitute for the commonly used solvent borne coating system. In present work, we have developed the polyurethane coatings from diethanolamide of fatty acid and dicarboxylic acid (sebasic acid and succinic anhydride) based Polyesteramide resin as Polyol along with 2, 2'-dimethylol propionic acid (DMPA) and isophorone diisocyanate (IPDI). The chemical structure of bio-based polyols and PU coatings was elucidated by FTIR and 1 H NMR spectroscopy. The polyurethane dispersions prepared were analyzed by particle size analysis and stability. The Mahua oil based polyurethane dispersions (PUDs) were coated on the metal panels, the cured material obtained was characterized, the physico-mechanical, chemical resistance tests and thermal properties were compared with the petroleum source based polyurethane dispersion (PUDs). The polyurethane dispersion coatings showed good physico-mechanical properties, chemical resistance and thermal stability. Hence the dispersion prepared from bio-based polyols may find application as eco-friendly coatings.

Fig 1: Recycle process of Renewable source based Polyurethane product

SEPARATION AND DETERMINATION OF THALLIUM(III) USING N-*N*-OCTYLCYCLOHEXYLAMINE AS AN EXTRACTANT

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Abstract:

N-*n*-octylcyclohexylamine (N-*n*-OCA) is used as analytical extractant for the extraction, separation and determination of Tl(III). N-*n*-OCA was employed as a ion-pair forming a neutral [N-*n*-OCAH^+ $TlCl_4^-$] complex from hydrochloric acid medium. The maximum extraction of Tl(III) was observed with N-*n*-OCA in the range 0.03 to 0.07 M dichloromethane and xylene. The extracted ion-pair complex of Tl(III) and N-*n*-OCA was back stripped with 7 M NH_3 and determined by spectrophotometrically with standerd method. The optimum extraction conditions were determined from a critical study of effect of acid, concentration of N-*n*-OCA, equilibrium time, solvent study, loading capacity, strippent study. On the basis of slope analysis method stoichiometry of extracted ion-pair complex was determined and it was found to be 1: 4: 2 (Metal: Acid: Extractant). The method has been extended to separate and to estimate Tl(III) in the presence of diverse ions, binary mixture of associated metal ions, multicomponent mixture, water samples and sequential separation of thallium(III) from thallium(I) by using N-*n*-OCA and results of analysis were confirmed by ICP-OES. The value of LOD was found to be 8.2618 µg/mL, LOQ was found 24.7854 µg/mL and the linearity of method was obtained in the range of 5 to 25 µg/mL.

Keywords: Liquid-Liquid Extraction; Separtion of Tl(III) From Tl(I); N-*N*-Octylcyclohexylamine; Real Samples Analysis, Water Samples.

ULTRASOUND ASSISTED SYNTHESIS OF *N*-ARYLAMIDES FROM NITRILES & 1-ARYLTRIAZENES USING BRØNSTED ACIDIC IONIC LIQUID

Omkar T. Patil, Sanika B. Choukulkar, Sanika D. Patil and Suraj M. Sutar*

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Abstract:

Ultrasonic assisted rapid and eco-friendly synthesis of an array of *N*-aryl amides is accomplished in good to better yields employing Brønsted acidic ionic liquid as promoter. The similar reaction also progressed under conventional mode of heating, but at relatively slower rate. Structurally varied 1-aryltriazenes and aliphatic/aromatic nitriles are evaluated in this metal-free approach and demonstrate the versatility of this protocol. A better functional group tolerance, mild reaction conditions, ultrasonic assistance, short reaction time, reuse and recycle of Brønsted acidic ionic liquid makes this method more practical and efficient to the existing methods.

DESIGN AND SYNTHESIS OF HIGHLY FUNCTIONALIZED COUMARIN CHROMOPHORES AS PLAUSIBLE FLUORESCENT PROBES

Suraj M. Sutar*, Aslam S. Bagwan and Avadhutrao S. Jadhav

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Abstract:

Library of 7-aryl-4-methylcoumarins were synthesized using Suzuki, Heck and Sonogashira coupling protocol in ionic liquid medium for the very first time. The functional group tolerance, short reaction time and use of ionic liquid under mild reaction conditions highlights this reaction protocol. The synthesized 7-arylcoumarin analogues were then tested for their antimicrobial activity evaluation against the selected antibacterial and antifungal strains. Out of the synthesized 34 coumarin conjugates, compound **11, 22** and **29** found to exhibit better antibacterial activity while compound **11, 15** and **28** displayed excellent antifungal properties. The preliminary studies confirms the efficiency of the synthesized compounds as optoelectronic material.

SYNERGISTIC FE–CO REDOX CHEMISTRY IN POLYOL-SYNTHESIZED LITHIUM IRON COBALTITE FOR ENERGY STORAGE APPLICATIONS

Suraj D. Sutar[1], Prashant N. Nikam[2], Sidhdika N. Inamdar[1], Rajendra P. Patil[3] and Asmita S. Tapase[1*]

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Abstract:

In the present work, $Li_{0.5}Fe_{1.5}Co_{1.0}O_4$ spinel ferrite was successfully synthesized via a polyolmediated route**,** aiming to develop an efficient electrode material for supercapacitor applications. The polyol method enabled controlled nucleation and growth, resulting in phase-pure and uniformly distributed nanostructures. The crystallographic structure of the synthesized material was confirmed by X-ray diffraction (XRD), revealing a single-phase cubic spinel structure. FTIR and Raman spectroscopy further validated the formation of metal–oxygen bonds and spinel lattice vibrations, confirming structural integrity. FESEM analysis demonstrated a nanoscale spherical morphology and size 43.37 nm with interconnected particles, which is beneficial for electrolyte penetration and charge transport. The elemental composition and oxidation states of Li, Fe, Co, and O were examined using X-ray photoelectron spectroscopy (XPS)**,** indicating the presence of mixed valence states responsible for enhanced redox activity. The electrochemical performance of $Li_{0.5}Fe_{1.5}Co_{1.0}O_4$ was evaluated using standard supercapacitor techniques like CV and GCD. The electrode delivered a high specific capacitance of 502.1 Fg^{-1} at a current density of 10 mA cm^{-2}**,** attributed to synergistic redox reactions of Fe and Co ions and improved electrical conductivity. The results demonstrate that polyol-synthesized $Li_{0.5}Fe_{1.5}Co_{1.0}O_4$ is a promising, low-cost electrode material for high-performance supercapacitor applications.

Keywords: Spinel Ferrite Nanostructures, Supercapacitor Electrode; Electrochemical Energy Storage, Specific Capacitance

STRUCTURAL AND SPECTROSCOPIC INVESTIGATION OF FE_2O_3 NANOPARTICLES PREPARED BY THE POLYOL METHOD

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Abstract:

Metal oxide nanomaterials have gained considerable attention due to their excellent chemical stability, tunable electronic structure, rich redox chemistry, and wide applicability in energy storage and catalysis. However, the polyol method is an effective chemical route for synthesizing metal oxide nanoparticles with controlled size and crystallinity. In this study, iron oxide (Fe_2O_3) nanoparticles were synthesized using a polyol-mediated approach, where ethylene glycol acted as the solvent, reducing agent, and stabilizing medium. Metal salt precursors were heated under reflux conditions to promote controlled nucleation through metal–polyol complex formation. The obtained products were centrifuged, washed, dried, and calcined to 500^0C achieve crystalline oxide phases. X-ray diffraction (XRD) analysis confirmed the formation of phase-pure, nanocrystalline Fe_2O_3 structures. Fourier transform infrared (FTIR) spectroscopy revealed characteristic metal–oxygen stretching vibrations, confirming oxide formation and effective removal of organic residues after calcination. The results demonstrate that the polyol method provides a simple, scalable, and reliable route for synthesizing transition metal oxide nanoparticles suitable for catalytic and energy-related applications.

Keywords: Iron Oxide, Polyol Method, Nanoparticles

QUALITATIVE PHYTOCHEMICAL ANALYSIS OF *MURRAYA KOENIGII* WITH REFERENCE TO KARAMBALI VILLAGE OF GADHINGLAJ CITY

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Abstract:

Murraya Koenigii commonly called as curry leaves, belongs to the *Rutacea Family,* it leaves were collected from Karambali village of Gadhinglaj city, Kolhapur district. For extraction solvents such as Ethanol, Acetone, Chloroform and Aqueous solvents were used. It was used for the qualitative phytochemical analysis of secondary metabolites like carbohydrates, alkaloids, phenol, proteins, amino acid, tannins, steroid, coumarin, flavonoids. Phytochemical screening showed that Chloroform and Aqueous extracts gave maximum number of phytochemicals test for major metabolites. Ethanol extract gave moderate number of phytochemical test, while Acetone extract showed the least number of phytochemicals indicating fewer phytochemicals.

Keywords: *Murraya koenigii*, Ethanol, Acetone, Chloroform and Aqueous Solvents.

SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF A NEW AMINOPYRIMIDINE SCHIFF BASES LIGAND AND ITS FE(III) COMPLEXES

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Abstract:

The New Schiff base ligand derived from 3-Ethoxy-2-hydroxybenzaldehyde & 2aminopyrimidine and its Fe(III) complexes was synthesized. The synthesized compounds have been characterized by FT-IR, ^{1}H-NMR and UV-Vis techniques for the ligands and FT-IR, UVVis, all reactions monitored by TLC, molar conductivity and magnetic susceptibility measurements for the corresponding complexes. The complexe is paramagnetic. The results of the molar conductivity measurements indicated that all complexes are non-electrolytes in (DMSO). An octahedral geometry for all the complexes of. The ligands are bidentate, (L_1) through phenolic (OH) and azomethine nitrogen. The ligand and its complexes were screened for their antifungal and antibacterial activity against *Aspergillus niger, Penicillium chrysogenum, Fusarium moneliforme* and *Aspergllus flavus* and *Escherichia coli, Salmonella typhi, Staphylococcus aureus, B. subtilis.* The result indicated that the complexes exhibited good antifungal and antibacterial activities.

Keywords: Heterocyclic Schiff bases, 3-Ethoxy-2-hydroxybenzaldehyde & 2-Aminopyrimidine, Biological Activity.

A REVIEW OF FUTURE PERSPECTIVES IN GREEN NANOTECHNOLOGY FOR POLLUTION CONTROL

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[a]Department of Chemistry, Karmaveer Hire Mahavidyalaya, Gargoti, Kolhapur-416209

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Abstract:

Green nanotechnology holds a lot of hope for future attempts to stop pollution. It makes use of eco-friendly processes to create nanomaterials that may be applied to a range of pollution remediation approaches, such as air, soil, and water cleaning. By removing certain pollutants from polluted settings, these materials are designed to improve the quality of the air, water, and soil. Globally, wastewater contamination is a serious hazard to both the environment and public health. Innovative methods are needed to address this worldwide issue, and nanotechnology has shown promise as a remedy. This study aims to provide light on the evolution of nanotechnology, including both the present and next phases. Nanotechnology has great potential in addressing the pressing issue of wastewater pollution. High surface area-to-volume ratios and customisable physicochemical characteristics are two special benefits of nanotechnology that make it possible to create remediation solutions that are both extremely effective and reasonably priced. Current developments in this subject include a range of nanomaterials, such as nanoparticles, nanocomposites, and nanomembranes, that are intended to remove a variety of pollutants, including organic contaminants, microbes, and heavy metals. This study examines the current and potential applications of nanotechnology in the cleanup of wastewater pollutants. The current analysis examines the developing patterns and encouraging opportunities for enhancing wastewater pollution removal efficiency via the use of nanoscale materials and methods.

Keywords: Nanotechnology; Pollution Control; Catalysis; Environmental Remediation

SYNTHESIS AND CHARACTERIZATION OF 7-AMINO-4-METHYLCOUMARIN SCHIFF'S BASES

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Abstract:

In this study, a series of Schiff's bases derived from 7-amino-4-methylcoumarin were synthesized via condensation reactions with various aromatic aldehydes. The synthesized compounds were obtained in good yields and were characterized by standard spectroscopic techniques including FTIR, UV-Vis, ^{1}H NMR, and ^{13}C NMR spectroscopy. The structural elucidation confirmed the formation of imine (-C=N-) linkages, indicating successful Schiff base formation. The purity and physicochemical properties of the compounds were also assessed using melting point determination and elemental analysis. The study highlights the potential of 7amino-4-methylcoumarin as a versatile precursor for Schiff base synthesis, laying a foundation for further investigation into their biological and photophysical properties.

FROM BENCH TO BEDSIDE: CLINICAL PROSPECTS AND CHALLENGES OF TETRAZOLE ACETAMIDE-BASED THERAPEUTICS

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Abstract:

Tetrazole acetamides represent an emerging class of small-molecule therapeutics that combine the unique bioisosteric properties of the tetrazole ring with the versatile pharmacological profile of the acetamide moiety. This review comprehensively evaluates the translational pathway of tetrazole acetamide derivatives from preclinical discovery through clinical development. We systematically analyse their therapeutic applications across major disease domains including infectious diseases, oncology, metabolic disorders, and neurological conditions, with particular emphasis on compounds that have progressed to clinical trials. The discussion encompasses key pharmacological attributes such as enhanced metabolic stability, improved bioavailability, and target selectivity conferred by the tetrazole acetamide scaffold. We critically examine the clinical performance of advanced candidates, addressing both successful developments and encountered setbacks. Major challenges including formulation optimization, toxicity profiles, metabolic interactions, and regulatory considerations are thoroughly analysed. Furthermore, we provide strategic insights into overcoming translational barriers through innovative drug delivery systems, prodrug approaches, and combination therapy strategies. By synthesizing clinical data with mechanistic understanding, this review aims to provide a roadmap for the rational development of next-generation tetrazole acetamide-based therapeutics with enhanced clinical success rates.

Keywords: Tetrazole Acetamides, Clinical Translation, Pharmacokinetics, Toxicity Profiling, Formulation Challenges, Therapeutic Applications

PHYSICO-CHEMICAL PARAMETERS OF DIFFERENT BOREWELL OF WATER FROM NOOL (M.S), INDIA

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Abstract:

The present investigation evaluates the physico-chemical characteristics of borewell water samples collected from Nool village, Gadhinglaj Tahsil, Kolhapur District, Maharashtra, India. Ten borewell water samples were collected during September 2023 and analyzed for important water quality parameters such as pH, electrical conductivity, alkalinity, total hardness, calcium, magnesium, chloride, and turbidity using standard analytical methods. The results were compared with World Health Organization (WHO, 1963) drinking water standards. Most parameters were found within permissible limits; however, samples S1 and S7 showed higher values of total hardness, calcium, magnesium, and turbidity, indicating the need for treatment before domestic use.

Keywords: Different Borwell of Water, Physico-Chemical Parameters, Potable, Nool Village

ADVANCEMENTS IN FERMENTATION-BASED BIOETHANOL PRODUCTION: ROLE OF SACCHAROMYCES CEREVISIAE AND NOVEL TECHNIQUES

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Abstract:
The increasing demand for energy, combined with the depletion of fossil fuel resources and increasing environmental pollution, has increased the interest in sustainable and renewable alternative fuels. Bioethanol has emerged as a promising renewable energy source due to its biodegradability, low toxicity, and compatibility with existing fuel infrastructure. Among various microorganisms, Saccharomyces Cerevisiae plays a crucial role in fermentation-based bioethanol production due to its high ethanol tolerance, efficient glucose metabolism, and robust fermentation performance. Conventional ethanol production processes primarily based on micro-structured yeast and require extended fermentation times, which limit productivity and economic viability. Recent research efforts have therefore focused on improving fermentation efficiency through advanced techniques such as process optimization, genetic and metabolic engineering, immobilization strategies, ultrasound-assisted fermentation, and the development of nano- and hybrid yeast systems. These novel approaches have demonstrated significant improvements in reaction kinetics, ethanol yield, and process stability while reducing fermentation time and energy consumption. Finally the review summarizes recent advancements in fermentation-based bioethanol production; highlight the evolving role of Saccharomyces Cerevisiae and emerging technologies that enhance fermentation performance. The review also covers the current challenges and future perspectives for emerging cost-effective, high-efficiency bioethanol production systems to support sustainable energy development.

Keywords: *Saccharomyces Cerevisiae*, bioethanol, Fermentation, Environmental Remediation etc.

TETRAZOLE CARBOXAMIDES AS ENZYME INHIBITORS: A SYSTEMATIC REVIEW OF KINASE, PROTEASE, AND REDUCTASE TARGETS

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Abstract:

Tetrazole carboxamides represent a structurally versatile and pharmacologically promising class of enzyme inhibitors, combining the bioisosteric advantages of the tetrazole ring with the hydrogen-bonding proficiency of the carboxamide group. This systematic review provides a comprehensive analysis of tetrazole carboxamide derivatives as targeted inhibitors of kinases, proteases, and reductases—three enzyme families central to the pathogenesis of cancer, infectious diseases, and metabolic disorders. The discussion encompasses the molecular basis for target engagement, emphasizing how the distinct physicochemical properties of the tetrazole–carboxamide motif facilitate selective binding and potent inhibition across diverse catalytic sites. Representative inhibitors from each enzyme class are examined with respect to their inhibitory profiles, synthetic routes, and therapeutic potential. Current challenges related to selectivity, pharmacokinetics, and translational development are critically evaluated, alongside emerging strategies in rational drug design and multi-target inhibition. By consolidating recent advances in this expanding chemical space, this review aims to inform and inspire the continued development of tetrazole carboxamide-based inhibitors as next-generation therapeutics for clinically significant enzyme targets.

Keywords: Tetrazole Carboxamides, Enzyme Inhibitors, Kinase Inhibitors, Protease Inhibitors, Reductase Inhibitors, Drug Design

ETHNOMYCOLOGICAL DOCUMENTATION AND DIVERSITY ANALYSIS FROM KUCCHALU VILLAGE, MALNAD REGION OF SHIVAMOGGA DISTRICT, KARNATAKA, INDIA

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Abstract:

Macrofungal diversity in the forested landscapes of India's Western Ghats remains underexplored, particularly in the Malnad region's biodiversity hotspots. This study documents mushroom species richness, ecological guilds and ethnomycological value in Kucchalu village, Tirthahalli taluk, Shivamogga district, Karnataka. The study area comprises 699 hectares featuring moist deciduous and semi evergreen forests with high monsoon rainfall at ~2869 mm annually. Field surveys were conducted during peak fruiting from June to September 2025, employing 10x10 m belt transects across 20 sites (n=3 replicates). Species identification was meticulously performed by expert taxonomists specializing in Western Ghats macrofungi. Twelve macrofungal species across 8 families were recorded. *Termitomyces heimii* (Agaricaceae, termitophilous, 40% abundance), *Lentinus squarrosulus* (Marasmiaceae, lignicolous edible), *Amanita cf.* phalloides (Amanitaceae, toxic), *Russula sp*. (Russulaceae, ectomycorrhizal), *Ganoderma lucidum* (Ganodermataceae, medicinal polypore), *Schizophyllum commune* (Schizophyllaceae, wood-decay saprotroph), *Pleurotus ostreatus* (Pleurotaceae, edible oyster), *Trametes versicolor* (Polyporaceae, white-rot), *Lycoperdon pyriforme* (Agaricaceae, puffball), *Coprinus comatus* (Coprinaceae, inky cap), *Volvariella volvacea* (Pluteaceae, paddy straw edible), and *Hexagonia hydnoides* (Polyporaceae, bracket fungus). Study shows that Saprotrophs dominated (58%), followed by ectomycorrhizals (25%) and parasites (17%). Findings reveal that documented macrofungi show ethno-utilitarian value (edibles, medicinals) for locals, threatened by deforestation. Study urges habitat conservation and expanded molecular surveys to develop Karnataka comprehensive fungal biodiversity atlas.

Keywords: Macrofungi, Western Ghats, Kucchalu, Tirthahalli, Ethnomycology, Termitomyces

ALMOST LATTICE DERIVED SEMIGROUPS

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Abstract:

Semigroups arising from Almost lattice (AL) structures are investigated. It is proved that the set of all functions from AL S into itself is also an AL. The concept of order-preserving maps on $T(S)$ is discussed, and it is proved that the sets $JH(S)$ (all join homomorphisms on S), $MH(S)$ (all meet homomorphisms on S) and $End(S)$ (all endomorphisms on S) are submonoids of $T(S)$. Further Green's relations on an almost lattice S are defined and some properties of R -classes, Lclasses and D-classes are established.

2020 Mathematical Sciences Classification: 06B75.

Keywords: Almost Lattice, normal Almost Lattice, Greens Relations, Translation Map.

ULAM STABILITY RESULTS FOR NONLINEAR MIXED FRACTIONAL INTEGRODIFFERENTIAL EQUATIONS WITH FRACTIONAL INTEGRAL BOUNDARY CONDITIONS

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Abstract:

The purpose of this paper is to study different types of Ulam stability for a nonlinear mixed fractional integro-differential equation with the Hilfer fractional derivative on a closed interval. The main results are derived using the Banach fixed point theorem.

Keywords: Fractional Integro-Differential Equation, Ulam-Hyers Stability, Ulam-Hyers-Rassias Stability, Semi-Ulam-Hyers-Rassias Stability, Banach Fixed Point Theorem, Hilfer Fractional Derivative

POTENTIAL OF BACTERIAL EXOPOLYSACCHARIDE FOR ENVIRONMENTAL APPLICATION: HEAVY METAL CLEANUP

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Abstract:

The ecofriendly solution for environmental pollution is a major prerequisite in current scenario. Among the pollution types, heavy metal contamination is a major fear. The role of microorganism to tackle the heavy metal pollution is significant and should be focused. In present study we have focused an exopolysaccharide (EPS)-producing agricultural isolate, *Pantoea agglomerans*. The EPS production is a protective response to stress to survive and grow in the metal-contaminated environment. *P. agglomerans* show tolerance to presence of heavy metals, i.e., mercury, copper, silver, arsenic, lead, chromium, and cadmium. Various analytical techniques were applied to confirm metal accumulation and functional involved in metal binding such as EDX and FTIR. The ICP-AES identified the location of cell-bound and intracellular metal accumulation. Electron microscopy was used to study the effect on bacterial morphology, sites of metal accumulation and structural changes. Thus, we put forward the potential EPS producing bacteria under metal stress for metal bioremediation.

Keywords: Bioremediation, Abiotic Stress, Biopolymer, Biosorption

MICROBIAL PIGMENTS AS PHOTOCATALYSTS FOR NANOMATERIAL SYNTHESIS AND APPLICATIONS

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Abstract:

Nanotechnology is a rapidly growing field of science due to its diverse applications. To meet the demands of nanomaterials, various methods are available for the synthesis of nanomaterials. These include physical, chemical, and biological methods. However, most of them have limitations due to their toxic effects on the environment, release of hazardous byproducts, and the requirement of high energy. These factors have significantly attracted attention and intensified interest in safer, non-toxic nanomaterial synthesis approaches. In the present study, an extracellular food-grade fungal pigment was used as a photocatalyst for the synthesis of silver nanoparticles under sunlight. The synthesized silver nanoparticles were characterized by UV–vis spectrometry, FE-SEM, HR-TEM, and DLS, which revealed spherical-shaped and welldispersed nanoparticles with a size of 10–30 nm. The green-synthesized nanoparticles were employed to study their applications as antimicrobial and antibiofilm agents against bacterial pathogens, demonstrating significant activity against the tested pathogens. Furthermore, the silver nanoparticles showed selective Hg sensing with a detection limit of 22.7 µM in a dispersed solution of AgNPs. Overall, the present microbial pigment-driven approach is rapid and ecofriendly for the synthesis of biocidal silver nanoparticles compared to traditional approaches.

Keywords: Antibacterial, Anti-biofilm *Monascus* sp., Nanoparticles, Pigments

CARBON QUANTUM DOTS FROM TURMERIC LEAVES: ROS-REGULATED PLANT GROWTH ENHANCEMENT AND NANO-FERTILIZER POTENTIAL

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Abstract:

In modern agriculture, nano-fertilizers have emerged as a promising alternative to conventional fertilizers by enhancing nutrient use efficiency, minimizing excessive chemical inputs, and reducing environmental impact. In this study, carbon quantum dots (CQDs) were synthesized from turmeric leaves using a green hydrothermal method at low reaction temperature. The asprepared CQDs were characterized by FTIR, XRD, and TEM, confirming their amorphous nature with an average particle size of 8–10 nm. The synthesized CQDs were evaluated as a nano-fertilizer for onion (Allium cepa L.), using aqueous solutions of different concentrations (control, 10 ppm, 30 ppm, and 50 ppm). Plant growth parameters including seed germination rate, shoot length, root length, and bulb weight were systematically monitored and analyzed. The results revealed a concentration-dependent enhancement in plant growth and final yield, with CQD-treated plants showing significantly improved performance compared to the control. Importantly, reactive oxygen species (ROS) generation was experimentally measured, revealing that CQDs induce moderate and controlled ROS levels within plant tissues. This regulated ROS production is believed to play a crucial role in plant growth. In short, the present study demonstrate that turmeric leaf–derived CQDs act not only as plant growth promoters but also as ROS-mediated nano-fertilizers, offering a sustainable, eco-friendly strategy for improving crop productivity.

Keywords: Nanotechnology; Carbon Quantum Dots; ROS; Plant Growth Regulator.

SYNTHESIS AND CHARACTERIZATION OF POLYMER BASED HUMIDITY SENSOR

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Abstract:

Polymer-based humidity sensors were synthesized and characterized using electrodeposited polyaniline (PANI) and polypyrrole (PPy) thin films to form a p-PANI/n-PPy heterojunction structure. Conducting polymers were selected because of their easy synthesis, environmental stability, room-temperature operation, and high sensitivity at low gas concentrations. PANI thin films were grown by galvanostatic electrodeposition from an electrolyte containing 0.45 M aniline in 0.4 M H_2SO_4 at a current density of 4.5 mA cm^{-2} for 300 s, while PPy films were deposited from 0.03 M pyrrole in 0.05 M H_2SO_4 with 0.1 M KNO_3 at 6 mA cm^{-2} for 325 s.

The structural and morphological properties of the films were investigated by X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD confirmed the amorphous nature of both PANI and PPy thin films, which is advantageous for humidity adsorption. SEM analysis revealed interconnected nanowires and a porous nanofiber network in PANI, while PPy exhibited compact nanograins with average diameters of 10–20 nm, providing a large effective surface area for moisture interaction.

The fabricated p-PANI/n-PPy heterojunction was evaluated for humidity sensing by measuring current density–voltage (J–V) characteristics at different relative humidities (40%, 60%, 80%, and 90%). A pronounced increase in current density with increasing humidity was observed, attributed to enhanced protonic and electronic conduction due to water adsorption within the polymer matrix.

These results demonstrate that electrodeposited polymer heterojunctions offer a simple, low-cost, and highly sensitive platform for humidity sensing, suitable for environmental monitoring and industrial applications.

Keyword: Heterojunction, Polymer, Humidity Sensor

HIERARCHICALLY POROUS CARBON AEROGEL FROM SUGARCANE JUICE FOR SUPERCAPACITOR APPLICATIONS

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Abstract:

The sweep increase in demand of low-cost, environmentally friendly, and flexible supercapacitors with high energy and power densities has been increased nowadays. In this context, the utilization of biomass-derived materials for the fabrication of carbon electrodes with hierarchical pore structures has emerged as a promising and sustainable approach. Carbon aerogels, with their interconnected hierarchical porous structure, high specific surface area, and good electrical conductivity, are promising electrode materials for electric double-layer charge storage EDLCs. In this work, a green and cost-effective carbon aerogel is synthesized using sugarcane juice as a renewable carbon source via a hydrothermal route, avoiding toxic and expensive supercritical drying. The surface area analysis reveals a distinctive scoop-like porous architecture, facilitating efficient ion diffusion and electrolyte accessibility. The material exhibited a high specific surface area of 2028 m^2/g along with an ultra-low bulk density of 0.08 g/cm^3, confirming the formation of a lightweight and highly porous carbon framework suitable for EDLCs. To evaluate its electrochemical performance, the synthesized carbon aerogel powder was screen-printed onto a flexible stainless-steel mesh and tested in a 6.0 M KOH aqueous electrolyte. Cyclic voltammetry (CV) and galvanostatic charge–discharge (GCD) studies reveal typical EDLC behavior with excellent capacitive characteristics. The electrode delivers a specific capacitance of 262 F/g from CV measurements and 372 F/g from GCD analysis, indicating efficient charge storage arising from the large accessible surface area and interconnected pore structure. Electrochemical impedance spectroscopy (EIS) further confirms favorable charge transport properties, with a low solution resistance (Rs) of 2.4 Ω and a charge-transfer resistance (Rct) of 45 Ω. These electrochemical results highlight the promising potential of sugarcane juice–derived carbon aerogel as a sustainable, flexible, and high-performance electrode material for nextgeneration energy storage devices.

Keywords: Biomass, Carbon aerogel, Hydrothermal, Supercapacitor.

XPS AND FESEM ANALYSIS OF FLUORINATED SILICA THIN FILMS DERIVED FROM TEOS FOR ANTICORROSIVE APPLICATIONS

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Abstract:

Silica (SiO_2) thin films were prepared using tetraethyl orthosilicate (TEOS) as a silica precursor and fluorinated silanes, namely trimethoxy (3,3,3-trifluoropropyl silane) (FAS-3) and 1H,1H,2H,2H-perfluorodecyl trimethoxysilane (FAS-17), with ethanol as solvent. The prepared films were characterized to investigate their structural, surface, and anticorrosive properties. Xray photoelectron spectroscopy (XPS) confirmed the formation of Si–O–Si networks and the successful incorporation of fluorinated groups on the film surface. Field emission scanning electron microscopy (FESEM) revealed uniform and dense surface morphology, indicating good film formation. The anticorrosive performance of the coated substrates was evaluated, and the results demonstrated enhanced corrosion resistance for fluorinated SiO_2 thin films compared to unmodified silica coatings. The improvement in corrosion protection is attributed to the presence of fluorinated groups, which reduce surface energy and limit the penetration of corrosive species. These results suggest that fluorinated SiO_2 thin films are promising candidates for protective anticorrosive coating applications.

Keywords: Thin Films, XPS, FESEM, Anticorrosive.

SYNTHESIS AND DIELECTRIC STUDIES OF TRYPTOPHAN-DOPED EUF_3 NANOPARTICLES

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Abstract:

Holmium-doped EuF_3 nanoparticles were synthesized at room temperature using an aqueous solution method, with tryptophan acting as an organic ligand. X-ray diffraction analysis confirmed the formation of a hexagonal phase. The calculated lattice parameters were a = b = 6.966 Å and c = 7.322 Å, corresponding to a unit cell volume of 307.69 $Å^3$. These values show close agreement with standard JCPDS data (No. 32-0373). The average crystallite size, estimated using the Debye–Scherrer equation, was found to be 73.54 nm. Structural analysis revealed that the nanoparticles belong to the hexagonal phase with space group P3c1 (165). Dielectric properties, including dielectric constant (ε′), dielectric loss (ε″), and loss tangent (tan δ), were investigated over a frequency range of 100 Hz to 5 MHz at room temperature. Both dielectric constant and dielectric loss exhibited an exponential decrease with increasing frequency. The low dielectric loss observed at higher frequencies suggests potential applicability of these nanoparticles in electronic devices.

Keywords: Tryptophan; Dielectric Constant; Dielectric Loss; Loss Tangent

CdSe THIN FILMS PHOTOELECTROCHEMICAL CELL USING CHEMICAL BATH TECHNIQUE

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Abstract:

This study used a non-aqueous liquid to deposit a thin layer of Cadmium Selenide onto a stainless steel substrate. To produce high-quality films, the different physical preparation parameters and the deposition conditions such as the deposition duration and temperature, chemical species concentrations, pH, mechanical stirring speed, etc. were tuned. The prepared sample was examined for composition and is less smooth, diffusely reflecting, and firmly adhering to the substrate's support. Characterizing the photoelectrochemical cell of the photoelectrodes includes examining current-voltage characteristics in the dark, capacitancevoltage in the dark, barrier-height measurements, power output, photo response, and spectrum response. The junction ideality factor was found to be low for the CdSe composition. The barrier height and flat band potential were found to be 0.181 eV and 710 mV, respectively. The short circuit current, open circuit voltage, conversion efficiency, and fill factor are 141 □A/cm^2, 210 mV, 0.54%, and 43.08%, respectively, according to the power output characteristic. The spectral response shows the highest current measured at 725 nm.

Keywords: Cds Thin Film, CBD Methods, Photoelectrochemical Research, Photoelectrode, Optical And Electrical Characteristics.

EFFECT OF CONTROLLED OXIDATION ON THE ELECTROCHEMICAL CHARGE STORAGE OF GRAPHENE OXIDE

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Abstract:

Graphene Oxide (GO) is promising material for supercapacitor due to its high surface area, tuneable surface chemistry and abundant oxygen functional group. In present study, Graphene oxide with varying oxidation levels was synthesized using a modified hummers method by controlling $KMnO_4$ concentration. Structural and morphological properties was examined by different characterization techniques XRD, Raman, FTIR, XPS, SEM and EDS. X-Ray Diffraction (XRD) study confirms expansion in layers of Graphene with increased oxidation state. Raman Spectroscopy reveals increased defect state with preservation of conductive sp^2 carbon networks. X- Ray Photoelectron Spectroscopy (XPS) and Fourier Transform Infrared Spectroscopy (FTIR) confirmed the regulated incorporation of oxygen functional groups. Scanning Electron microscopy (SEM) exhibited the typical wrinkled, sheet-like structure of reflects modified morphology of GO. Electrochemical investigations demonstrated that tuning the oxidation level plays critical role in charge storage behaviour by optimizing the balance between surface redox activity and electrical conductivity. The optimized GO sample exhibited improved capacitive performance, highlighting its potential for supercapacitor application.

Keywords: Graphene Oxide, Electrochemical Performance, Supercapacitor, Oxidation, Hummer's Method.

EXTRACTION OF SILICA FROM BAGASSE (CANE SUGAR HUSK) USING INCINERATION AND CHEMICAL TREATMENT

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Abstract:

Bagasse or Cane Sugar husk (CSH) is an ample agricultural by-product, and its managed combustion produces Cane Sugar husk ash (CSHA), a wealthy source of amorphous silica (SiO_2). This have a look at focuses on the extraction of excessive-purity silica from CSHA via optimized chemical and thermal remedies.

Unprocessed CSH become subjected to managed burning at different temperatures (400–850°C) to reap silica-wealthy ash. Pre-remedy with acid changed into accomplished to do away with steel impurities, followed via alkali leaching the use of sodium hydroxide (NaOH) or potassium hydroxide (KOH), which converted silica into soluble silicates.

The silicate solution turned into then subjected to acid precipitation with sulfuric acid (H_2SO_4) or hydrochloric acid (HCl), leading to the formation of silica gel. The gel changed into purified through washing, drying, and calcination to obtain nice silica powder.

Characterization become performed using X- ray diffraction (XRD), Fourier-rework infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and thermogravimetric evaluation (TGA), confirming the amorphous nature, surface morphology, useful groups, and thermal stability of the extracted silica.

The resulting fabric became tested for capacity series in adsorbents, catalyst supports, cementitious substances, and nanocomposites. The findings demonstrate the economic significance of CSHA-derived silica and highlight its capacity as a sustainable raw fabric within the framework of waste valorization and inexperienced chemistry.

Keywords: Cane Sugar Husk Ash, Silica Withdrawal, Sodium Silicate, Acid Precipitation, Amorphous Silica, Sustainable Substances, Waste Valorization.

CORE SEMICONDUCTOR DEVICES IN ELECTRONICS: A REVIEW

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Abstract

Semiconductor devices lie at the heart of modern electronics, enabling everything from simple rectifier circuits to complex amplification and control systems. This review offers a clear and engaging overview of essential semiconductor concepts and devices commonly studied at the undergraduate level. It begins with a brief introduction to semiconductors, highlighting intrinsic and extrinsic materials, majority and minority charge carriers, and the formation and key properties of the p–n junction. The electrical behaviour of the p–n junction under forward and reverse bias conditions, along with its V–I characteristics, is succinctly discussed. The review then explores semiconductor diodes and their practical applications as rectifiers, including halfwave, full-wave, and bridge rectifier circuits. Concepts such as ripple factor and the role of filter circuits in improving DC output quality are also emphasized. Special attention is given to the Zener diode, focusing on its operation and importance as a voltage stabilizer in regulated power supplies. Finally, the article introduces bipolar junction transistors, covering their types, symbols, working principles of npn and pnp transistors, and commonly used configurations such as common emitter, common base, and common collector. Overall, this review presents a compact yet informative perspective on semiconductor devices, blending theory with applications to build a strong conceptual foundation in electronics.

MODIFIED LIKELIHOOD INFERENCE WITH NUISANCE PARAMETERS: COMPUTATION AND SIMULATION.

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Department of Statistics

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In likelihood-based inference, nuisance parameters often lead to poor finite sample performance of standard estimators. Profile likelihood(PL) methods, although computationally convenient, may aggravate this problem by introducing additional bias. In this paper, an explicit expression for the first-order bias of the PL estimator is derived. Motivated by this result, a bias-corrected modified maximum likelihood estimator is proposed. The proposed estimator achieves secondorder bias reduction while retaining first-order efficiency. Computational aspects of the estimator are discussed, and its finite sample performance is examined through Monte Carlo simulations for normal and gamma models. Reproducible R code is provided to support the simulation results.

EFFECT ON BIOMOLECULES DUE TO CESTODE INFECTION IN DOMESTIC FOWL AHILYNAGAR DISTRICT. (M.S), INDIA

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Abstract:

The aim of present Study was to determine the effect on protein, lipid and glycogen biomolecules due to infection of cestode parasite in host Domestic Fowl, the result shows that changes in biomolecules content due to cestode infection Glycogen content in cestode 13.2 mg/gm and Host intestine (normal) contain 41.3 mg/gm and infected intestine of host contented 36.11mg/gm. The protein level of Cestode showing 6.8 mg/gm of tissue whereas in host intestine (Normal) 15.4 mg/gm weight of tissue of an infected intestine of host intestine 10.8 mg/gm wt. of tissue While The lipid content of Cestode is showing 26.4 mg/gm of tissue whereas in host intestine (Normal) 22.1 mg/gm weight of tissue of an infected intestine of host intestine 8.3 mg/gm wt. of tissue

Keywords: Cestode parasite, Domestic Fowl, Biomolecules

PHYTOCHEMICAL AND GC-MS ANALYSIS OF *TRIGONELLA FOENUM-GRAECUM* (L.) LEAF EXTRACT.

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Abstract:

The bioactive components found in medicinal plants have been utilized for centuries, making them a valuable therapeutic alternative. The secondary metabolites found in medicinal plants are significant for the treatment of various diseases and serve as essential raw materials for the manufacture of both traditional and modern medications. The annual herb fenugreek (*Trigonella foenum-graecum*), belongs to family- Fabaceae, found all over the world. It is cultivated for human consumption in the various developed countries as Europe, North Africa, Yemen, India, Mediterranean and France.

In the present investigation for phytochemical and GC-MS analysis of *Trigonella foenum-graecum*, the extracts were prepared in aqueous, alcohol and acetone solvents through successive Soxhlet extraction. Among the tested extracts, the acetone extracts of *T. foenum -graecum*, showed highest number of phytochemicals as compared to other extracts. These phytochemical compounds present in the extracts may be useful in future pharmaceutical formulations.

Keywords: *Trigonella foenum-graecum*, Soxhlet apparatus, Phytochemicals, GC-MS

ENVIRONMENTAL DETERMINANTS OF ZOOPLANKTON AND FISH DIVERSITY IN A SEMI-LOTIC RIVER SYSTEM OF MAHARASHTRA

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Abstract:

The present study investigates the spatiotemporal variation in zooplankton and fish diversity across four sites of the Warana River Kakhe (Site I), Chikurde (Site II), Ghunaki (Site III), and Shigaon (Site IV) from January 2023 to December 2024. Comprehensive field sampling and taxonomic identification revealed notable differences in community composition among Rotifera, Cladocera, Copepoda, and related microinvertebrate groups, as well as key fish taxa inhabiting the riverine ecosystem. Seasonal fluctuations in abundance patterns were evident, with monsoon-driven hydrological shifts strongly influencing species richness and distribution. The assessment highlighted the ecological significance of zooplankton as primary indicators of water quality and trophic dynamics, while fish assemblages reflected habitat conditions and anthropogenic pressures. Overall, the findings provide essential baseline data that contribute to understanding biodiversity patterns in the Warana River and offer valuable insights for conservation planning, aquatic resource management, and future ecological assessments.

Keywords: Biodiversity, Fish Diversity, Seasonal Variation, Warana River, Zooplankton Diversity.

ANTIMICROBIAL POTENTIAL OF *OCIMUM SANCTUM*-MEDIATED IRON OXIDE NANOPARTICLES AGAINST SERICULTURE-RELATED PATHOGENS

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Abstract:

Microbial diseases represent a major constraint in sericulture, leading to significant losses in silkworm (*Bombyx mori*) productivity and silk quality. In the present study, iron oxide nanoparticles (Fe_2O_3 NPs) were synthesized using an eco-friendly green approach employing *Ocimum sanctum* leaf extract and evaluated for their antimicrobial potential against silkwormassociated pathogenic microorganisms. The biosynthesized nanoparticles were formed through phytochemical-mediated reduction and stabilization of iron ions and subsequently characterized to confirm nanoparticle formation. Antimicrobial activity was assessed using standard in vitro assays against selected bacterial and fungal strains relevant to sericulture. The green-synthesized Fe_2O_3 nanoparticles exhibited notable antimicrobial efficacy, as evidenced by concentrationdependent inhibition of microbial growth. The observed activity is attributed to the nanoscale size and surface functionalization by plant-derived bioactive compounds, which enhance interactions with microbial cell membranes, leading to cellular damage and growth inhibition. Importantly, the green synthesis route avoids the use of toxic chemicals, making the nanoparticles biologically compatible and suitable for agricultural and sericultural applications. The findings suggest that *Ocimum sanctum*-mediated iron oxide nanoparticles hold promise as a sustainable antimicrobial agent for controlling microbial infections in sericulture, thereby contributing to improved silkworm health and silk production

Keywords: Green Synthesis; Iron Oxide Nanoparticles; *Ocimum sanctum*; Antimicrobial Activity; Sericulture; *Bombyx mori*

TOXIC EFFECTS OF SODIUM ARSENATE ON OXYGEN CONSUMPTION AND GILL ARCHITECTURE OF THE FRESHWATER CRAB *BARYTELPHUSA CUNICULARIS* (WESTWOOD IN SYKES,1836)

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Abstract:

Among the number of chemicals, arsenic is a most common pollutant in aquatic bodies causing hazardous health problems, specifically to vital organs. The present study aimed to evaluate the change in oxygen consumption and histopathological alterations due to sodium arsenate on the gills of freshwater crab, *Barytelphusa cunicularis*. Experimental crabs were treated with Sodium arsenate (pre-determined mean LC_{50} – 640.04 ppm) up to 96 hrs. Experimental animals showed acute and highly significant reduction in rate of oxygen consumption as compared to controlled animals. Gender wise, males exhibited greater sensitivity than females against intoxicated chemical. Histological examination of the gills revealed progressive structural alterations including lamellar swelling, cuticular detachment, epithelial hyperplasia, necrosis, loss of hemolymph from the lamellae, structural collapse, frizzled gill lamellae, and a marked reduction in intracellular space. Prolonged exposure resulted in complete disintegration of the lamellar architecture. Overall findings indicated that sodium arsenate can cause severe respiratory dysfunction and irreversible gill damage in *Barytelphusa cunicularis*, highlighting its potential threat to freshwater crustaceans. Obtained results were interpreted regarding safe application of chemicals for survivability and maintenance of animals in the balanced ecosystem.

Keywords: Sodium Arsenate, *Barytelphusa cunicularis*, Oxygen Consumption, Respiratory Impairment.

CUR-PLGA NANOPARTICLES AND TRIGONELLINE RESTORE GLYCEMIC CONTROL AND PANCREATIC INTEGRITY IN STZ-INDUCED DIABETIC MICE

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Abstract:

Diabetes mellitus is characterized by insulin resistance and persistently elevated blood glucose levels, which ultimately lead to impaired insulin secretion and progressive pancreatic dysfunction. Streptozotocin (STZ)-induced diabetes closely mimics these pathophysiological features and is therefore widely employed as an experimental model for evaluating antidiabetic interventions. Curcumin is well recognized for its potent antidiabetic and antioxidant activities; however, its therapeutic efficacy is severely limited by poor aqueous solubility and low bioavailability. To overcome these limitations, curcumin-loaded poly (lactic-co-glycolic acid) nanoparticles (Cur-PLGA NPs) were developed. In parallel, trigonelline, a naturally occurring alkaloid with documented antihyperglycemic properties, was evaluated as a comparative therapeutic agent. Cur-PLGA nanoparticles were synthesized using the solvent emulsion evaporation technique and characterized by particle size distribution and zeta potential analysis, confirming uniform particle size and colloidal stability. Mice were randomly assigned to five groups: Control, Diabetic (STZ, 45 mg/kg, i.p.), Glibenclamide-treated (5 mg/kg, oral), Trigonelline-treated (60 mg/kg i.p.), and Cur-PLGA NP-treated (80 mg/kg i.p.). Treatments were administered daily for 15 days following diabetes induction. STZ-induced diabetic mice exhibited pronounced hyperglycemia, a significant reduction in serum insulin levels, and histopathological changes in pancreas, including β-cell degeneration and disruption of islet architecture. Treatment with Cur-PLGA nanoparticles and trigonelline resulted in marked improvement in glycemic control and restoration of serum insulin levels, with effects more prominent than those observed with glibenclamide. Histological examination further revealed substantial preservation of pancreatic architecture and improved islet morphology in treated groups. In conclusion, Cur-PLGA nanoparticles and trigonelline effectively restore glycemic control and pancreatic integrity in STZ-induced diabetic mice, highlighting their potential as promising therapeutic strategies for diabetes management.

HABITAT PREFERENCE OF OXYOPIDAE FAMILY SPIDERS IN THE WAI REGION, MAHARASHTRA, INDIA

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Abstract:

The Oxyopidae family, commonly known as lynx spiders, are dynamic cursorial predators found in various landscapes, including agricultural, semi-natural, and natural ecosystems. This research examines the habitat preferences of Oxyopidae spiders in the Wai area of Maharashtra, India, highlighting variations in species composition and abundance across different vegetation types and microhabitats in the pre-monsoon and post-monsoon seasons. A standardized sampling strategy was employed across four primary habitat types: crop fields, grasslands, riverine vegetation, and scrubland. The Oxyopes sataricus was the most abundant species (46.67 %) while Oxyopes Shweta showed the least abundance (6.67). The species richness indices are Oxyopidae spider assemblage showed moderate diversity with uneven species distribution, dominated by Oxyopes sataricus, while Oxyopes shweta occurred as rare species. The abundance of Oxyopes spiders showed clear seasonal trend, with maximum occurrence in the Post-monsoon period and minimum during monsoon, reflecting the influence of rainfall and Vegetation structure on spider distribution.These insights deepen our understanding of Oxyopidae ecology while providing essential data for conservation efforts and agricultural pest management within the Wai region.

Keywords: Oxyopidae, Lynx Spiders, Habitat Preference, Biodiversity, Wai, Maharashtra

ARTIFICIAL INTELLIGENCE IN LIFE SCIENCE RESEARCH AND HEALTHCARE

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Abstract:

Artificial Intelligence (AI) has rapidly emerged as a transformative force in life science research and healthcare, providing innovative solutions to complex biological and medical challenges. By integrating machine learning, deep learning, and advanced data analytics, AI enables efficient analysis of large and complex datasets generated from genomics, proteomics, medical imaging, and electronic health records.

In life science research, AI significantly accelerates drug discovery and development. Conventional drug development processes are costly and time-intensive; however, AI-driven models can predict drug–target interactions, identify promising drug candidates, and optimize clinical trial designs. AI is also extensively applied in genomics and systems biology to analyze gene expression patterns, identify biomarkers, and uncover molecular mechanisms underlying diseases. These applications enhance research efficiency, accuracy, and reproducibility while reducing overall timelines.

In healthcare, AI plays a vital role in improving clinical decision-making. AI-based tools enhance disease diagnosis, risk prediction, and patient monitoring. In medical imaging, AI systems assist in the accurate detection of abnormalities in radiology, pathology, and microscopy images. Predictive models help clinicians anticipate disease progression, enabling early intervention and personalized treatment strategies. Despite its significant advantages, the adoption of AI in life sciences and healthcare faces challenges, including data privacy concerns, ethical issues, algorithm transparency, and the need for high-quality, unbiased datasets. Addressing these challenges through strong regulatory frameworks and interdisciplinary collaboration is essential to ensure responsible and effective AI implementation. Overall, AI represents a powerful tool for advancing life science research and modern healthcare, with the potential to improve research efficiency, clinical outcomes, and global health sustainability.

Keywords: Artificial Intelligence, Life Sciences, Healthcare, Machine Learning, Drug Discovery, Medical Imaging, Personalized Medicine

LIMNOLOGICAL STUDY OF HERE WATER RESERVOIR IN CHANDGAD TAHASIL DIST.KOLHAPUE

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Abstract:

Water is the most important factor of environment. It is one of the vital compounds of life. The quality of water usually described according to its physical, chemical and biological properties. Due industrialization and indiscriminate use of chemical fertilizers and pesticides in agriculture is causing heavy pollution in aquatic environment leading to deterioration of water quality and depletion of aquatic life. Due to use of contaminated water, human populations suffer from water borne diseases and affect the aquatic life. It is therefore necessary to check the water quality at regular. The present investigation has been evaluating the physic-chemical and biological parameters of dam water of Here, in Chandgad Tahasil Dist. Kolhapur (M.S). Limnological study was done for a period of one year. Water samples were collected from various places of Kajirne dam from January to December. The parameters were analyzed which includes temperature, PH, Transparency, Turbidity, Total Dissolved Solids, Conductivity, Dissolved oxygen, free CO_2, alkanity, chloride, Total Hardness and BOD. The biological parameters are Phytoplankton, Zooplankton and E.Coli. Result obtained reveals that parameters are within the range prescribed by WHO and ISI standard for drinking purpose.

Key words- Here, Pesticides, Fertilizers, Transparency, Hardness.

ASSESSMENT OF ICHTHYOFAUNAL DIVERSITY ALONG THE DEVGAD COASTAL REGION OF SINDHUDURG DISTRICT, MAHARASHTRA, INDIA

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Abstract:

Devgad coast, is a significant part of the kokan coastline situated in the Sindhudurg district, supports a wide variety of marine fauna due to its complex habitat and favorable environmental conditions. This study aims to assess and document the marine ichthyofaunal diversity in Devgad coast of Maharashtra through literature review, comprehensive field surveys and local fishery records. The field surveys were conducted between October 2023 to September 2024 across selected fish market and secondary data analysis. A detailed analysis of ichthyofaunal diversity revealed that 35 species of fish scattered amongst 23 families belonging to 11 orders were recorded, highlighting the ecosystem diversity and economic significance of the region. The dominant order observed included Acanthuriformes, Scombriformes, Carangiformes and Clupeiformes among others. These findings study the economically significant and several threatened fish species within the Devgad coast, emphasizing the socio-economic and ecological relevance of the area. The data collection of these species indicated in decline population due to habitat degradation and overfishing, underlying implementation of conservation efforts and sustainable fishing practices. Such practices are essential for ensuring the long-term sustainability of local fisheries, which serve as a major livelihood for coastal communities. These finding enhance the ichthyofaunal diversity of devgad coast and highlight these species as sustainable food alternative. This research provides essential baseline data for conducting future ecological studies in the Konkan region, biodiversity conservation and fishery management.

Keywords: Diversity, Devgad, Marine Fish

A STUDY ON DIVERSITY OF SCALE INSECTS AROUND TIPTUR LAKE, KARNATAKA, INDIA.

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Abstract:

Scale insects (Hemiptera: Coccomorpha) are significant agricultural pests and ecological indicators, yet their diversity in semi-arid ecosystems like those surrounding Tiptur Lake, Karnataka, remains underexplored. This study investigates the species richness, abundance, and distribution of scale insects in riparian and adjacent agricultural habitats around the lake, a vital freshwater resource supporting diverse flora and local livelihoods.

Sampling was conducted quarterly from June 2025 to December 2025 across 20 sites, using visual inspections, stem sweeps, and sticky traps on key host plants including mango (*Mangifera indica*), guava (*Psidium guajava)*, and native shrubs. A total of 28 species across 12 genera and 7 families were identified, with Coccidae (52%) and Diaspididae (28%) dominating. Aspidiotus destructor and *Parlatoria ziziphi* emerged as the most abundant, comprising 35% of collections, primarily on fruit orchards. Shannon diversity index averaged 2.45 ± 0.32, highest in riparian zones (H' = 2.78), reflecting microhabitat heterogeneity influenced by lake proximity and seasonal monsoons.

Ordination analyses (NMDS) revealed host plant specificity and elevation gradients as key drivers of community structure, with invasive species like *Icerya purchasi* expanding in disturbed sites. These findings highlight moderate scale insect diversity, underscoring threats to horticulture and the need for integrated pest management. Conservation of lake-edge vegetation could enhance biocontrol agents, promoting sustainable agroecosystems in Karnataka.

Keywords: Scale Insects, Biodiversity, Tiptur Lake, Karnataka, Coccomorpha, Host Specificity.

NEMATODE INFECTION AND ITS HAEMATOLOGICAL MANIFESTATIONS IN CAPRA HIRCUS.

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Abstract:

The present study deals with the effect of helminthic infection as Nematode parasite like Ascaris on the Haematological parameters of Capra hircus. The Haematological parameters were studied viz. RBC, WBC, Hb, PVC, MCV, MCH and DLC Differential leukocyte count the Capra hircus carrying heavy infection host showed significant decrease in the Hb, RBC, PVC, MCV, MCH in comparison with normal, whereas WBC increased in infected host.

Keywords: Haematology, *Capra hircus*, Nematode, Ascaris.

FIRST RECORD OF THE GREAT INDIAN BUSTARD (*ARDEOTIS NIGRICEPS)* AT TULSHI RESERVOIR, MAHARASHTRA, INDIA

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Abstract:

The Great Indian bustard (*Ardeotis nigriceps*) is a critically endangered grassland bird with a highly restricted and fragmented distribution in India. During routine biodiversity surveys conducted at Tulshi Reservoir, Kolhapur District, Maharashtra, a single adult individual of *A. nigriceps* was recorded, constituting the first confirmed record of the species from this locality. The bird was observed in an open habitat mosaic comprising grassland patches and fallow agricultural land along the reservoir periphery. Identification was confirmed through direct field observation and photographic documentation using standard ornithological field guides, including *The Book of Indian Birds* by Salim Ali. No evidence of breeding or long-term residency was observed, suggesting transient or occasional habitat use. This record extends the known distribution of the species within Maharashtra and highlights the potential ecological significance of reservoir-associated open landscapes as temporary habitats for threatened grassland birds. Documentation of such occurrences contributes valuable information to current knowledge on the spatial occurrence of *A. nigriceps* and emphasizes the need for landscape-level monitoring and conservation attention beyond designated protected areas.

Keywords: *Ardeotis nigriceps,* First Record, Grassland Bird, Maharashtra, Tulshi Reservoir.

GREEN SYNTHESIS OF SE–ZNO NANOCOMPOSITE USING *GYMNEMA SYLVESTRE* LEAF EXTRACT: EVALUATION OF BIOMEDICAL AND PHOTOCATALYTIC ACTIVITY

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Abstract:

This study reports a facile and eco-friendly green synthesis of a selenium-doped zinc oxide (Se–ZnO) nanocomposite using *Gymnema sylvestre* leaf extract as a natural reducing and stabilising agent. The phytochemicals present in the plant extract enable the formation of well-dispersed nanocomposites without the use of toxic chemicals, making the process sustainable and cost-effective. The synthesized Se–ZnO nanocomposite was systematically characterised using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy, UV–visible spectroscopy, scanning and transmission electron microscopy (SEM/TEM), and energy-dispersive X-ray analysis (EDX), confirming successful selenium incorporation, high crystallinity, and nanoscale morphology. Biomedical activities were evaluated through antibacterial and antioxidant assays, where the Se–ZnO nanocomposite exhibited significantly enhanced performance compared to pristine ZnO, attributed to synergistic effects, increased surface reactivity, and selenium-induced defect states. The photocatalytic activity was investigated via the degradation of organic dye pollutants under UV/visible light irradiation, demonstrating superior degradation efficiency, faster reaction kinetics, and improved charge separation behaviour. The enhanced photocatalytic performance is associated with bandgap modulation, reduced electron–hole recombination, and the presence of bio-capped surface functionalities. Overall, this study highlights the potential of *Gymnema sylvestre*-mediated Se–ZnO nanocomposites as multifunctional materials for biomedical applications and environmental remediation, offering a promising green alternative for the synthesis of advanced nanomaterials.

Keywords: Green Synthesis; Se–Zno Nanocomposite; *Gymnema sylvestre*; Biomedical Activity; Photocatalysis; Dye Degradation.

IMPROVED CYTOKINES FOR THERAPY

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Abstract:

Cytokine treatments have the potential to revolutionize the treatment of infectious, autoimmune, and cancer diseases. But their shorter half-life, widespread pleiotropic signaling, and systemic toxicity have restricted the clinical use. Mechanistically, they enhance T cell proliferation, differentiation, and effector functions by modulating key signaling pathways, enabling precise control of Th1, Th2, Th17, and Treg responses. The engineered cytokines show improved stability, a longer half-life, and activity that targets specific tissues while still providing strong immune-stimulating effects. In preclinical models, they demonstrate better effectiveness compared to wild-type cytokines. However, Recombinant cytokines frequently cause dose-limiting side effects that limit their therapeutic window, such as capillary leak, immune overactivation, hypotension, and flu-like symptoms. To overcome these limitations, we have altered these cytokines to achieve their maximum therapeutic potential.

Keywords: Cytokines, T cells, Bioavailability, Therapy.

THE KNOEVENAGEL CONDENSATION REACTION OF MALONONITRILE AND AROMATIC ALDEHYDE UNDER GREEN AND MILD CONDITIONS

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Abstract:

The Knoevenagel condensation reaction is a fundamental carbon–carbon bond-forming process widely employed in organic synthesis for constructing α,β-unsaturated carbonyl and nitrile compounds. In this study, a green and mild synthetic protocol was developed for the condensation of malononitrile with various aromatic aldehydes using the water extract of Tinospora ash as an efficient natural catalytic medium. The catalyst, derived from an eco-friendly biomass source, exhibited remarkable catalytic activity under ambient conditions, leading to high yields of the desired substituted benzylidene malononitriles within short reaction times. The method offers several advantages, including the avoidance of toxic organic solvents, simple experimental setup, easy catalyst preparation, and recyclability. This work demonstrates the potential of plant-based ash extracts as sustainable catalysts for promoting organic transformations, aligning with the principles of green chemistry and providing a cost-effective and environmentally alternative to conventional catalysts.

FORMATION OF NANOCRYSTALLINE $MNCO_2O$, VIA SOL-GEL ROUTE AND ITS STRUCTURAL CONFIRMATION.

Dhairyashil Kanase, Gourav Ambi, Siddhi Patil, Shruti Patil, A. S. Tapase

Abstract:

Mixed metal oxides exhibit synergistic effects arising from the interaction of multiple metal cations, resulting in enhanced electrical conductivity and redox activity in energy storage and catalysis compared to single-metal oxides. Manganese cobaltite ($MnCo_2O_4$) is a mixed transition metal oxide with a spinel crystal structure that has gained significant attention due to its excellent electrochemical activity, rich redox chemistry, and high structural stability. In the present work, $MnCo_2O_4$ nanoparticles were synthesized via the sol–gel method, which provides good control over stoichiometry, homogeneity, and particle size. Manganese and cobalt nitrate precursors were complexed with a suitable chelating agent to form a uniform gel, followed by drying and calcination at 700°C to obtain crystalline $MnCo_2O_4$. X-ray diffraction (XRD) analysis confirmed the formation of a single-phase cubic spinel structure with a nanocrystalline nature. Fourier transform infrared (FTIR) spectroscopy further verified the metal–oxygen stretching vibrations corresponding to tetrahedral and octahedral sites, confirming the removal of organic residues after calcination. The synthesized $MnCo_2O_4$ shows good phase purity, making it a promising material for energy storage and electrocatalytic applications.

ASSESSMENT OF SUB-CHRONIC BEHAVIORAL TOXICITY OF HALOSULFURON-METHYL HERBICIDE IN *CYPRINUS CARPIO* L.

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Abstract:

Halosulfuron-methyl, a sulfonylurea herbicide widely used in agriculture, poses potential risks to aquatic ecosystems, particularly freshwater fish like *Cyprinus carpio* L, a key species in fisheries toxicology studies. This investigation evaluates subchronic behavioral abnormalities induced by $1/8^{th}$ of LC_{50} at 69.625 mg/L, exposure over 40 days. Juvenile carp (n=10, 15-20 g) was divided into control and treatment groups with three replicates each, maintained under static renewal conditions. Behavioral responses are observed such as locomotor activity, swimming patterns, avoidance response, surfacing frequency and feeding latency was quantified daily via video tracking. Acetylcholinesterase (AChE) activity and hematological parameters were assayed biweekly. Results revealed that there is a dose and time dependent toxicity. Acetylcholinesterase inhibition progressed from 25% at day 10, 55% at day 40, correlating with 60% locomotor reduction, erratic bursts and heightened avoidance. Surfacing increased by day 32, signaling respiratory distress. Antioxidant defenses was peaked at mid-exposure but depleted gradually, indicating oxidative stress overload. No mortality was occurred, but cumulative stress and impaired growth was observed. These findings highlights that halosulfuron-methyl herbicide is neuro disruptive potential at environmentally relevant concentrations, urging regulatory reassessment for Indian aquaculture. Mitigations via bioremediation and reduced application is recommended.

Keywords: Halosulfuron-methyl, *Cyprinus carpio*, Sublethal Exposure, Behavioral Toxicology, AChE Inhibition.

ISOLATION AND CHARACTERIZATION OF DETERGENT DEGRADING BACTERIA FROM KARAD REGION

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Abstract:

The extensive use of synthetic detergents has led to their persistent accumulation in aquatic and terrestrial environments, posing serious ecological and public health concerns. Microbial biodegradation offers an effective and eco-friendly approach for the removal of detergent pollutants. The present study focuses on the isolation and characterization of detergentdegrading bacteria from the Karad region, an area exposed to domestic and industrial detergent discharge. Soil and water samples were collected from detergent-contaminated sites and subjected to enrichment culture techniques using detergent-supplemented media to selectively isolate potential degraders. Morphologically distinct bacterial isolates were obtained and screened for their detergent degradation efficiency through growth analysis and degradation assays. Selected isolates were further characterized based on colony morphology, Gram staining, and a series of biochemical tests to determine their physiological and metabolic properties. The degradation potential of the isolates was evaluated under varying concentrations of detergents, indicating their tolerance and adaptability to detergent-rich environments. Results revealed the presence of efficient detergent-degrading bacterial strains capable of utilizing detergent compounds as a carbon source. These isolates demonstrated significant degradation activity, suggesting their possible application in bioremediation processes. The study highlights the microbial diversity present in detergent-polluted sites of the Karad region and underscores the role of indigenous bacteria in mitigating detergent pollution. The findings provide a foundation for future studies on molecular identification and large-scale application of these bacteria in wastewater treatment and environmental management strategies.

Keywords: Detergent Degradation, Bioremediation, Isolation, Characterization, Bacteria, Karad Region

STUDY OF FAUNAL DIVERSITY ASSOCIATED TO DURGAON RESERVOIR, KARJAT TEHSIL, MAHARASHTRA, INDIA

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Abstract:

Freshwater aquatic biodiversity refers to the variety of life forms that inhabit freshwater ecosystems, including rivers, lakes, ponds, wetlands, and streams. These ecosystems are vital for the health of the planet, providing essential services such as clean water, food, and habitat for countless species. Study of freshwater ecosystems explore the components of freshwater biodiversity, its ecological significance, the threats it faces, conservation efforts, and the role of policy and community engagement in preserving these vital ecosystems. Some of the most significant threats to any aquatic ecosystem include habitat degradation, water pollution, over-exploitation, species invasion, and flow modification. The study area is located around Durgaon reservoir, Karjat Tahsil Ahilyanagar district, Maharashtra, India. The field survey was conducted from June 2024 to May 2025 and total 36 faunal species were recorded from and nearby Durgaon reservoir consist of 12 species of Arthropods, 2 species of Molluscs, 3 species of fishes, 2 species of reptiles and 18 species of Birds. were recorded.

Keywords: Aquatic Ecosystem, Biodiversity, Durgaon Reservoir, Fauna.

DIVERSITY OF SPIDERS FROM BANALI SACRED GROVE (DIST- SANGLI, MS)

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Abstract:

The survey of spider diversity was carried out from the Banali Sacred Grove, located in Banali village of Jath tahsil in Sangli District of Maharashtra State. Banali Sacred Grove is famous for Goddess Banshankari having an area of about 27 acres. This Sacred Groves is protected by local community through social traditions and taboos that incorporate spiritual and ecological values. These groves harbor many spider species and rich in biodiversity. This area is with low rainfall, having hills and slopes with some bushy plants, grass, litter samples and trees. This region shows good number of spider diversity during the month of September to December. This is because of availability of food and breeding ground and undisturbed area. Rainfall is moderate and average of 500 mm. The climate is hot and dry. A total of 27 species belonging to 13 genera from 20 families were recorded from the study area, with a dominance of family Araneidae, Salticidae, Lycosidae and Thomisidae.

Keywords: Spider, Diversity, Banshankari, Banali, Sacred Groves

GREEN SYNTHESIS OF ZNO-NIO NANOCOMPOSITE USING LEAF EXTRACT OF CLITORIATERNATEA AND EVALUATION OF ITS ANTIBACTERIAL ACTIVITY"

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Abstract:

Green Synthesis of ZnO-NiO Nanocomposite using Leaf Extract of Clitoria ternatea and Evaluation of its Antibacterial Activity. Nanotechnology is a rapidly growing field, yet conventional chemical and physical synthesis methods often require toxic chemicals and high energy, posing environmental risks. To address this, this study employs an eco-friendly "green synthesis" approach using the leaf extract of Clitoria ternatea (Butterfly pea) to synthesize Zinc Oxide-Nickel Oxide (ZnO-NiO) nanocomposites. Clitoria ternatea was selected for its rich phytochemical profile, including flavonoids, tannins, and terpenoids, which act as natural reducing and stabilizing agents. The synthesis methodology involved mixing zinc nitrate hexahydrate and nickel nitrate hexahydrate with the plant extract at 50°C, adjusting the pH to 10 using sodium hydroxide, followed by drying and calcination at 500°C. Initial phytochemical analysis of the leaf extract confirmed the presence of tannins, flavonoids, and terpenoids. X-ray Diffraction (XRD) characterization of the synthesized nanocomposite (1:1 molar ratio) revealed diffraction peaks corresponding to the Miller indices of both ZnO and NiO, confirming the successful formation of the nanocomposite and its crystalline nature. The primary objective of this research is to develop a cost-effective, non-toxic antimicrobial agent to combat antibiotic-resistant microorganisms. Future work will focus on further characterization using SEM, TEM, and FTIR to determine morphology and functional groups, as well as the evaluation of the nanocomposite's antibacterial activity against pathogenic bacterial strains.

CORE SEMICONDUCTOR DEVICES IN ELECTRONICS: A REVIEW

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Abstract:

Semiconductor devices lie at the heart of modern electronics, enabling everything from simple rectifier circuits to complex amplification and control systems. This review offers a clear and engaging overview of essential semiconductor concepts and devices commonly studied at the undergraduate level. It begins with a brief introduction to semiconductors, highlighting intrinsic and extrinsic materials, majority and minority charge carriers, and the formation and key properties of the p–n junction. The electrical behaviour of the p–n junction under forward and reverse bias conditions, along with its V–I characteristics, is succinctly discussed. The review then explores semiconductor diodes and their practical applications as rectifiers, including half-wave, full-wave, and bridge rectifier circuits. Concepts such as ripple factor and the role of filter circuits in improving DC output quality are also emphasized. Special attention is given to the Zener diode, focusing on its operation and importance as a voltage stabilizer in regulated power supplies. Finally, the article introduces bipolar junction transistors, covering their types, symbols, working principles of npn and pnp transistors, and commonly used configurations such as common emitter, common base, and common collector. Overall, this review presents a compact yet informative perspective on semiconductor devices, blending theory with applications to build a strong conceptual foundation in electronics.

Keywords: Semiconductors; p–n Junction; Rectifier Circuits; Zener Diode; Bipolar Junction Transistor; Electronic Devices

EFFECT OF SMARTPHONE USAGE ON ENGINEERING STUDENTS USING MULTIPLE PARAMETERS

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*Corresponding author E-mail: chinthalameenakumari@gmail.com

Abstract:

In this paper, we discussed an Effect of Smartphone Usage on Engineering Students using Multiple Parameters, and collected data from 10 engineering students then analyzed and developed a relation by Statistical Methods.

Keywords: Correlation Analysis, Academic Performance, Sleep Quality, Concentration, Smartphone Addiction.

GREEN CHEMISTRY APPROACH TO ISOXAZOLE DERIVATIVES VIA NATURAL BIO-CATALYST

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Abstract:

Isoxazole scaffolds represent an important class of nitrogen–oxygen heterocycles with wide-ranging pharmacological potential, yet many conventional synthetic routes still rely on hazardous reagents, organic solvents, and energy-intensive conditions, which conflict with the principles of green chemistry. In the present work, a sustainable protocol has been developed for the synthesis of isoxazole derivatives using an aqueous extract of the aquatic fern Azolla as a natural bio-catalyst. Azolla, rich in polyphenols, proteins, and other phytoconstituents, is employed to promote the key cyclization/1,3-dipolar cycloaddition step between appropriately designed chalcones or aldoxime precursors and hydroxylamine, enabling efficient formation of the isoxazole ring under mild, solvent-poor or water-based conditions. The methodology avoids toxic metal catalysts and volatile organic solvents, operates at relatively low temperature with short reaction times, and provides good to excellent yields across a range of substituted substrates, highlighting improved atom economy and reduced waste generation typical of green synthetic strategies. The synthesized isoxazole derivatives are characterized by standard spectroscopic techniques (FT-IR, ^{1}H NMR, ^{13}C NMR, and mass spectrometry), and their potential biological relevance is supported by literature reports on the diverse antimicrobial, anti-inflammatory, and CNS-active profiles of isoxazole-based molecules. Overall, the use of Azolla as a low-cost, renewable bio-catalyst demonstrates a promising eco-friendly alternative for the preparation of isoxazole derivatives and can be extended to other heterocyclic frameworks within the broader context of sustainable medicinal chemistry.

PRO AND ANTIANGIOGENIC PROPERTIES OF *VITIS VINIFERA* BIOACTIVES: A SYSTEMATIC REVIEW OF EXTRACTS, MECHANISMS, AND THERAPEUTIC POTENTIAL

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Abstract:

Vitis vinifera is recognized for its diverse phytochemical composition, particularly polyphenols, which exert context-specific modulatory effects on angiogenesis. This review explores how different extraction solvents aqueous, alcoholic, benzene, and acetone impact the biological activity of grape-derived compounds using the chick chorioallantoic membrane (CAM) assay as an experimental platform. The choice of solvent was found to be a critical determinant of both chemical stability and biological response. Water and alcohol-based extracts generally favoured neovascularization, whereas benzene and acetone extracts produced inhibitory effects, indicating possible therapeutic applications in tissue regeneration and cancer, respectively. Mechanistic insights suggest these differential effects are mediated through oxidative stress regulation and angiogenic signalling, with changes observed in lipid peroxidation (LPO), glutathione (GSH), vascular endothelial growth factor (VEGF), and alkaline phosphatase (ALP). These molecular alterations parallel functional outcomes in endothelial proliferation, migration, and vessel organization within the CAM model. Despite promising findings, lack of standardized extraction protocols, limited reproducibility, and challenges related to bioavailability restrict clinical translation. Novel approaches, including nanotechnology-based delivery systems and integrative omics, may enhance consistency and therapeutic applicability. Overall, *Vitis vinifera* extracts display both pro- and anti-angiogenic properties depending on solvent systems, and the CAM model remains a valuable preclinical tool for screening. Further multidisciplinary research is essential to establish standardized methodologies and facilitate translational advancement.

Keywords: Angiogenesis, CAM Assay, Endothelial Response, Oxidative Stress, Polyphenols, VEGF Signalling.

EXTRACTION PROCESS OF TULSI & HARIDRA ESSENTIAL OIL AND THEIR MEDICINAL PROPERTIES.

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Abstract:

According to the European Pharmacopeia 7th edition essential oils are defined as "Odoriferous substances derived from plant raw materials obtained through steam distillation, dry distillation or mechanical method without heating exhibiting a complex composition. In general, a physical process is employed for extracting essential oil from the aqueous phase maintain the oils chemical properties unchanged. Oil are gathered from various fragrant plants. We selected the rhizome of *Curcuma longa* L (Turmeric), and Tulsi (Ocimum sanctum) plants for this article.Hence the selected essential oil from these plants were utilized in the current research. The oil was sourced from both plants were utilized to extract the essential oil. The extraction process was executed using the Soxhlet apparatus Clevenger apparatus.

Keywords: Essential Oil, Extraction Process, Turmeric (*Curcuma longa*), Tulsi (*Ocimum sanctum*) Ayurveda, Clevenger Apparatus Soxhlet Apparatus

STINGLESS BEES THE FUTURE OF APICULTURE

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Abstract:

Bees worldwide are facing serious survival challenges due to the excessive use of pesticides and the rapid loss of natural habitats. These factors have resulted in declining bee populations and their gradual disappearance from villages and urban areas. In this context, stingless bees (Meliponini) have emerged as a promising alternative for sustainable apiculture. Owing to their unique adaptive ability, stingless bees can thrive in modern human dwellings, including newly designed houses and apartment buildings. Their domestication in compact, artificial hives makes them suitable for urban and peri-urban environments. Culturing stingless bees in such settings not only supports their conservation but also ensures effective pollination of flowering plants, thereby enhancing agricultural productivity and ecosystem stability. Thus, stingless bee apiculture holds significant potential as a future-oriented, eco-friendly approach to pollination management and sustainable agriculture.

Keywords: Stingless Bees, Apiculture, Pesticides, Habitat Loss, Adaptation, Modern Housing, Pollination, Agriculture

EFFECT OF NI ION DOPING ON STRUCTURAL AND SUPERCAPACITIVE PERFORMANCE OF NANOSTRUCTURED MN_3O_4 THIN FILMS

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Abstract:

We have successfully deposited 1, 2, 3, and 4% Ni ion doped Trimanganese tetraoxide (Mn_3O_4) thin films via chemical precipitation route followed by electrodeposition for supercapacitor application. Ni ion doping does not altered structure but alters needle like morphology to nanoflakes like morphology. Due to enhanced porosity and surface area the doped Mn_3O_4 thin films have shown superior supercapacitive performance than pure Mn_3O_4 thin films. Out of all thin films 2% Ni ion doped thin film has exhibited excellent electrochemical performance and greater stability which was confirmed by cyclic voltammetry, galvanostatic charge discharge and electrochemical impedance spectroscopy techniques.

Keywords: Mn_3O_4 Thin Films; Electrodeposition Technique; Nanoflakes; Supercapacitors.

EMERGING TRENDS IN ENVIRONMENTAL GOVERNANCE: ANINTERDISCIPLINARY STUDY OF ENVIRONMENTAL SCIENCE AND PUBLIC ADMINISTRATION

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Abstract:
Environmental governance has become a critical domain in the context of accelerating climate change, increasing pollution levels, and growing sustainability challenges. Traditional regulatory mechanisms alone are no longer sufficient to address complex and interlinked environmental problems. This research paper examines emerging trends in environmental governance through an interdisciplinary framework integrating environmental science and public administration, with special reference to Maharashtra. The study analyses the adoption of digital tools, artificial intelligence, real-time pollution monitoring systems, satellite-based climate observation, and participatory governance mechanisms implemented by the Government of India and the Government of Maharashtra. Using a qualitative methodology based on secondary data, including government reports, policy documents, academic literature, and newspaper sources, the paper highlights how science-based administration and technological innovation are reshaping environmental governance. The findings suggest that Maharashtra reflects a progressive yet evolving model of environmental governance, though challenges related to institutional capacity, enforcement, and coordination persist.

Keywords: Environmental Governance, Emerging Trends, Climate Change, Pollution Monitoring, Public Administration, Maharashtra

EXTRACTION PROCESS OF TULSI AND HARIDRA ESSENTIAL OIL AND THEIR MEDICINAL PROPERTIES.

Sharma. A, Umale. L, and Sharma. S

Department of Chemistry, Shri Umiya Kanya Mahavidyalaya Rangwasa Rau Indore

Abstract:

According to the European Pharmacopeia 7th edition, essential oils are defined as "Odoriferous substances derived from plant raw materials obtained through steam distillation, dry distillation or mechanical method without heating exhibiting a complex composition. In general, a physical process is employed for extracting essential oil from the aqueous phase maintain the oils chemical properties unchanged. Oil are gathered from various fragrant plants. We selected the rhizome of *Curcuma longa* L (Turmeric), and Tulsi (*Ocimum sanctum*) plants for this article. Hence the selected essential oil from these plants were utilized in the current research. The oil was sourced from both plants were utilized to extract the essential oil. The extraction process was executed using the Soxhlet apparatus Clevenger apparatus.

Keywords: Essential oil, Extraction process, Turmeric (*Curcuma longa*), Tulsi (*Ocimum sanctum*), Ayurveda, Clevenger apparatus, Soxhlet apparatus

EFFECT OF COAL FLY ASH ON SOME ORGANS OF FISH CIRRHINUS MRIGALA- A HISTOPATHOLOGICAL STUDY

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Abstract:

Coal fly ash (CFA) is a byproduct of coal combustion in thermal power plants, enriched with oxides and trace metals. Improper disposal of CFA results in leaching of toxic metals into aquatic environments, leading to bioaccumulation, oxidative stress, and physiological damage in aquatic organisms. The present study investigated the toxicological impacts of CFA on the freshwater fish Cirrhinus mrigala under acute and chronic exposure conditions. Fish were exposed to CFA at concentrations of 1g/L, 3g/L, and 5g/L, and histopathological alterations were evaluated in gill, liver, intestine, and muscle tissues. In CFA-exposed fish showed pronounced histopathological changes in tissues in a concentration-dependent manner. Gill tissues showed curling and degeneration of secondary lamellae, epithelial upliftment, aneurism, hyperplasia, necrosis, and vacuolation, indicating impaired respiratory function. Hepatic tissues displayed cellular swelling, hypertrophy, altered hepatocyte morphology, thickened cell membranes, necrosis, and degeneration of sinusoidal spaces, reflecting disrupted metabolic activity. Intestinal tissues exhibited thinning of the serosa, vacuolization, separation of mucosal layers, muscle fiber damage, and localized necrosis, suggesting compromised nutrient absorption. Muscle tissues revealed inflammatory responses, fiber degeneration and necrosis, edema of muscle bundles, zigzag fiber arrangement, and focal lesions. The findings demonstrate that CFA induces severe histopathological damage in organs of fish C. mrigala, highlighting its potential ecotoxicological threat to freshwater ecosystems. These results emphasize the need of CFA disposal and effective mitigation strategies to reduce its adverse impacts on aquatic biodiversity and environmental health.

Keyword: CFA, Histopathology, Necrosis, Degeneration, Alteration.

ISOLATION AND CHARACTERIZATION OF POTASSIUM SOLUBILIZING BACTERIA FROM RHIZOSPHERIC REGION OF *CURCUMA LONGA*

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Abstract:

Potassium is one of the essential macronutrients for plant growth and plays an important role in several metabolic processes. Soil is a reservoir of various nutrients required for plant growth, including Potassium; however, its insoluble form makes it difficult for plants to uptake. Potassium fertilizers are commonly applied to mitigate potassium deficiency in crops; however, their extensive use can lead to significant environmental damage. The potassium-solubilising bacteria convert the insoluble form of potassium in to soluble by secreting organic acids. The soil samples were collected from the rhizospheric region of *Curcuma longa* and *Zea mays.* A total of eight isolates were obtained after serial dilution of soil sample on Aleksandrov media. Among them, one was screened based on qualitative and quantitative estimation of potassium solubilization. The isolated bacterial strain C-II exhibited a 21mm zone of solubilization, and significantly solubilized potassium (1.69mg/ml) in liquid medium, estimated by using KCL as a standard. Based on biochemical, morphological characteristics compared to Bergey's manual of determinative bacteriology isolate was identified as *Pseudomonas spp.* The isolated bacterial strain C-II is also able to produce some plant growth-promoting traits, including indole acetic acid and ammonia. Isolate is also able to fix nitrogen (confirmed by growth on nitrogen-free medium) and produce ACC deaminase, which helps plants to mitigate the stress induced by various environmental factors. The promising results suggest that the isolate can be utilized as a bioinoculant, a better, ecologically sustainable alternative to chemical fertilizer for crop plants.

Keywords: Potassium, *Curcuma longa*, *Pseudomonas spp,* Bioinoculant, Plant Growth-Promoting Traits.

A REVIEW OF WATER QUALITY IN KUWANO RIVER, BASTI (UTTAR PRADESH): PHYSICOCHEMICAL CHARACTERISTICS, MICROBIAL CONTAMINANTS, AND HUMAN HEALTH RISKS

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Abstract:

The water quality and microbial contamination of the Kuwano River in Basti district, Uttar Pradesh, examined using the Water Quality Index (WQI) method. The WQI approach was found to be an effective tool for evaluating the suitability of river water for human consumption, bathing, and agricultural use. Water samples were collected from multiple locations along the river during different seasons to examine seasonal variations in water quality. This review focuses on Physicochemical parameters such as pH, temperature, biological oxygen demand (BOD), and dissolved oxygen (DO) were analysed. Microbial contamination was evaluated by determining the presence of Escherichia coli, total coliforms, and faecal coliforms using standard microbiological methods.

The WQI values ranged between 60 and 80, categorizing the river water from poor to very poor quality. This review indicates that the water is unsuitable for direct human consumption without proper treatment and determine the level of pollution, identify potential health risks associated with the use of river water. These review findings highlights an urgent need for wastewater treatment facilities and public awareness programs to protect the river's water quality and safeguard public health.

Future studies should focus on detailed seasonal variations, long-term health impacts of water pollution, identification of pollution sources, and strategies to reduce microbial contamination. Regular monitoring and effective management of the river are essential to ensure environmental sustainability and protect the health of the local community.

Keywords: Water Quality, Microbial Contamination, Physiochemical property, Human Health.

STUDY OF INFLUENCE OF DIFFERENT SUBSTRATE ON GROWTH AND QUALITY OF VERMICOMPOST OF EISENIA FETIDA

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Abstract:

The earthworm species *Eisenia fetida* has been used due to its easy availability and handling, more cocoon production, and ease of maintenance. On days 30 and 60, the worm weight was consistently highest in set 4 (cow dung and sugar trash) and lowest in set 5 (cow dung and poultry waste), while in set 6 (cow dung and sericulture waste) the worm weight was medium. The vermicompost with sugarcane trash was rich in organic carbon, organic matter ratio, moisture, and showed a high amount of biomass production. In the kaner composition, the amount of zinc (Zn) was higher. Overall, all mixtures showed good results in terms of vermicompost quality.

EFFECT OF SMARTPHONE USAGE ON ENGINEERING STUDENTS USING MULTIPLE PARAMETERS

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Abstract:

In this paper, we discussed an Effect of Smartphone Usage on Engineering Students using Multiple Parameters, and collected data from 10 engineering students then analyzed and developed a relation by Statistical Methods.

Keywords: Correlation Analysis, Academic Performance, Sleep Quality, Concentration, Smartphone Addiction.

USE OF PROBIOTICS AND BIOFLOC TECHNOLOGY IN FISH CULTURE

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Abstract:

Aquaculture has become an essential source of animal protein worldwide. However, its rapid intensification has led to challenges such as deteriorating water quality, disease outbreaks, and increased dependence on antibiotics and commercial feeds. To overcome these issues and promote sustainable fish production, the use of probiotics and biofloc technology has gained considerable attention in recent years.

Probiotics are beneficial micro-organisms that improve the intestinal health of fish, enhance immune responses, and inhibit the growth of pathogenic bacteria. Their application in fish culture has been shown to improve growth performance, feed utilization, and survival rates, while reducing the need for chemotherapeutic agents. Biofloc technology is based on the development of microbial aggregates that convert organic waste and excess nutrients into useful microbial biomass. This process helps maintain water quality by reducing toxic nitrogenous compounds such as ammonia and nitrite.

The combined use of probiotics in biofloc-based systems creates a stable and biologically active culture environment. Biofloc serve not only as natural water purifiers but also as an additional protein-rich food source for fish, thereby improving feed efficiency and reducing production costs. This integrated approach minimizes water exchange, lowers environmental pollution, and supports higher stocking densities without compromising fish health.

In conclusion, the integration of probiotics and biofloc technology represents a promising and eco-friendly strategy for sustainable fish culture. Adoption of this approach can enhance productivity, improve environmental performance, and contribute to responsible aquaculture development in the face of increasing global food demands.

Keywords: Probiotics, Biofloc Technology, Fish Culture, Sustainable Aquaculture, Water Quality.

SUSTAINABLE MODERN ENGINEERING MATERIALS FOR ENVIRONMENTAL AND BIODIVERSITY PROTECTION

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Abstract:

Anthropogenic activities have intensified environmental degradation and biodiversity loss, necessitating innovative sustainable engineering materials that minimize ecological footprints while enhancing ecosystem resilience. This paper explores the design, synthesis, and application of bio-based, recycled, and hybrid nanocomposites for environmental protection and biodiversity conservation. Drawing from green chemistry and circular economy principles, we employ life-cycle assessment (LCA) to evaluate materials such as geopolymer concrete, biopolymers, and agro-waste composites, demonstrating reductions in CO_2 emissions by 45-80% compared to traditional counterparts.

Key innovations include erosion control, outperforming petroleum-based materials by a factor of 2.5 in sustainability metrics. These multifunctional materials support soil stabilization, water remediation, and habitat restoration, fostering biodiversity through nutrient release and reduced microplastic pollution.

The research bridges materials science with environmental engineering, advocating regenerative designs for net-zero impacts in the Anthropocene. Implications for policy and industrial scaling are discussed, with future directions emphasizing AI-optimized adaptive materials. This work aligns with UN Sustainable Development Goals 13 and 15, offering pathways to mitigate global biodiversity decline, where over 1 million species face extinction.

COMPARATIVE MOLECULAR PHYLOGENY OF COCCINELLID BEETLES FROM CHHATRAPATI SAMBHAJINAGAR (AURANGABAD) DISTRICT, MAHARASHTRA, INDIA

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Abstract:

Coccinellid beetles (family Coccinellidae) comprise a highly diverse assemblage of insects that play a vital role in the natural regulation of pest populations across various ecosystems. Despite their ecological significance, the evolutionary affinities among many coccinellid species remain inadequately resolved. In the present investigation, we analyzed the molecular phylogeny of five species; *Coccinella septempunctata*, *Cheilomenes sexmaculata*, *Coccinella transversalis*, *Hippodamia variegata*, and *Illeis cincta*. Two genetic markers were employed for this purpose: the mitochondrial cytochrome oxidase I (COI) gene and the nuclear 18S ribosomal RNA (18S rRNA) gene. Comparative analysis of these DNA sequences was carried out to elucidate the evolutionary relationships among the selected coccinellid species.

Keywords: Coccinellid Beetles, Molecular Phylogeny, Evolutionary Retalionships.

FORMATION OF ORGANOCHALCOGENES: SYNTHESIS, CHARACTERIZATION, ELECTROCHEMICAL INVESTIGATIONS AND ANTIOXIDANT ACTIVITY

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*Prof. C.N.R. Rao Research Center, Department of Chemistry,

Basaveshawar Science College, Bagalkot, Bagalkot University, Karnataka, India

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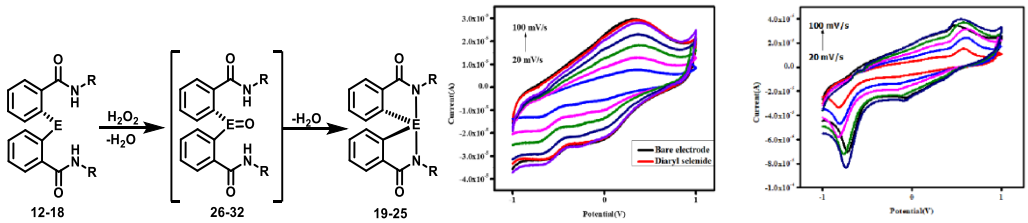
Abstract:

Spirodiazaselenuranes are structurally interesting compounds, whose stability highly depends on the nature of the substituents attached to the nitrogen atoms. Aromatic substituents are known to play important roles in stabilizing the Se-N bonds in spiro compounds. In this study, several amino acid substituted spirodiazaselenuranes are synthesized by introducing amino acids substituents to understand their effect on the stability of the Se-N bonds and the antioxidant activity. As per our previous studies aromatic and benzyl shows significant activity. Herein, the replacement of aromatic, benzyl substituent by amino acids shows interesting antioxidant activity.



Figu-1 Synthesis of Spirodiazaselenuranes and pproposed mechanism for the catalytic cycle of GPx. Effect of scanning rate on the electrochemical response of diaryl selenides (Phe) & (Tyr) by using cyclic voltammograms response with modified GC electrode under various scan rate.

Comparison of the glutathione peroxidase (GPx) mimetic activity of the compounds showed that the diaryl selenides having amino acids, with phenyl and heterocyclic rings are significantly more active due to the facile oxidation of the selenium/sulfur centre. However, the activity is reduced significantly for compounds having aliphatic amino acid substituents. In addition to GPx activity, cyclic voltammetric studies of selected diaryl selenides and corresponding spirodiazaselenuranes are discussed. The experimental observations suggest that the cyclic voltammetric studies show redox systems to be quasi-reversible involving electronic transfer.

Keywords: Glutathione peroxidase (GPx), Selenium, Antioxidants, Cyclic voltammetry Spirodiazaselenuranes.

SUPERHYDROPHOBIC SURFACES FOR OIL-WATER SEPARATION

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Abstract:

Efficient oil–water separation is essential for addressing environmental pollution caused by industrial wastewater and oil spills. This work reports a simple, low-cost method for fabricating a superhydrophobic surface using candle soot as a carbon nanoparticle source. Candle soot was uniformly deposited onto a substrate to form a hierarchical micro/nanostructure and subsequently stabilized to improve mechanical robustness. The prepared surface exhibits excellent superhydrophobicity with a water contact angle of approximately 160° and strong superoleophilicity. Owing to these properties, the candle soot–coated material enables selective oil permeation while effectively repelling water, achieving separation efficiencies above 98% for various oil–water mixtures. High oil flux (~10^4 L m^{-2} h^{-1}) and stable performance over multiple separation cycles were observed, indicating good reusability and durability. The facile fabrication process, low material cost, and high separation efficiency make candle soot–based superhydrophobic surfaces promising candidates for large-scale oil–water separation and environmental remediation applications.

AZOLES IN FOCUS: ECO-FRIENDLY SYNTHESIS AND VERSATILE PHARMACOLOGICAL POTENTIALS

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Abstract:
Azoles rank among the most versatile five-membered heterocycles in medicinal chemistry, their nitrogen-rich cores enabling precise interactions with biological targets to address pressing health challenges like fungal resistance and oncology. Contemporary synthesis pivots toward sustainability: sonochemical activation propels pyrazole construction from hydrazines and enaminones under solvent-free conditions, achieving 70–96% yields in 25-45 minutes compared to protracted reflux protocols that consume excess energy. Microwave-assisted copper catalysis drives azide-alkyne cycloadditions for 1,2,3-triazoles in aqueous media (89-99% efficiency), while ball-milling delivers N-acyl pyrazoles with aggregation-induced emission for dual therapeutic-optoelectronic roles, minimizing waste across the board. These methods empower azoles' pharmacological spectrum-triazoles disrupt fungal CYP51 to erode Candida biofilms and ergosterol integrity, imidazoles provoke ROS cascades in HepG2 carcinoma cells (IC50 <50 μM), and hybrid scaffolds dismantle bacterial mycolic acids, inhibit SARS-CoV-2 proteases, or selectively block COX-2 against inflammation. In the face of antimicrobial resistance, such multitarget designs promise resilient therapies. This review delineates these eco-efficient pathways, guiding development of high-impact leads that balance clinical efficacy with environmental responsibility.

Keywords: Azole Derivatives, Green Synthesis, Eco-Friendly Methodologies, Pharmacological Activities, Antifungal and Anticancer Potential

EMERGING TRENDS IN PARASITOLOGY: FROM BASIC SCIENCE TO APPLIED INNOVATIONS

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Abstract:
Parasitology has undergone significant transformation in recent years due to rapid advances in basic and applied sciences. Emerging trends in this field reflect a multidisciplinary integration of molecular biology, genomics, bioinformatics, immunology, and biotechnology, leading to improved understanding of parasite biology, host–parasite interactions, and disease transmission dynamics. At the basic science level, high-throughput sequencing, proteomics, and metabolomics have enabled deeper insights into parasite evolution, genetic diversity, and mechanisms of pathogenicity. These approaches have contributed to the identification of novel drug targets and vaccine candidates. In applied parasitology, innovations such as molecular diagnostics, point-of-care testing, nanotechnology-based drug delivery systems, and artificial intelligence–assisted surveillance are transforming disease detection, treatment, and control strategies. Additionally, the growing emphasis on One Health approaches highlights the interconnected roles of humans, animals, and the environment in parasitic disease emergence and re-emergence. Climate change, urbanization, and global travel further influence parasite distribution, necessitating adaptive and predictive control measures. This paper reviews the emerging trends bridging basic and applied parasitological research, emphasizing their potential to enhance disease management, reduce public health burden, and support sustainable global health interventions. Understanding and integrating these advances are essential for addressing current and future challenges posed by parasitic diseases.

Keywords: Parasitology; Emerging Trends; Host–Parasite Interaction; Molecular Diagnostics; Genomics; Applied Science; Disease Control; One Health

ADVANCES AND EMERGING PERSPECTIVES IN FISHERY SCIENCES

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Abstract:

Fishery sciences have undergone significant transformation in recent decades due to rapid technological progress, growing environmental concerns, and increasing demand for sustainable aquatic resources. Advances in stock assessment models, remote sensing, genomics, and data-driven management tools have enhanced the understanding of fish population dynamics and ecosystem interactions. Emerging perspectives emphasize ecosystem-based fisheries management, climate-resilient practices, and the integration of traditional ecological knowledge with modern scientific approaches. Innovations in aquaculture, including selective breeding, nutrition optimization, and disease management, have further contributed to improving productivity while reducing environmental impacts. Additionally, policy reforms and international cooperation play a crucial role in ensuring the long-term sustainability of fisheries. This review highlights recent scientific advancements and explores future directions aimed at balancing economic development, food security, and conservation of aquatic biodiversity.

Keywords: Fishery Sciences; Sustainable Fisheries; Ecosystem-Based Management; Aquaculture Innovation; Climate Change; Fish Stock Assessment; Biodiversity Conservation

DESIGN OF NAPHTHALENE-BASED AROMATIC POLYESTERS WITH BALANCED THERMAL STABILITY AND SOLUBILITY

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Abstract:

Two novel naphthalene-containing aromatic diols with amide linkages, with and without ether functionality, were synthesized and used to prepare a series of aromatic polyesters and copolyesters via phase transfer-catalyzed interfacial polycondensation using isophthaloyl chloride and terephthaloyl chloride. The resulting polymers exhibited inherent viscosities in the range of 0.35–0.58 dL/g and showed good solubility in polar aprotic solvents. Glass transition temperatures were observed between 123 and 179 °C, while thermogravimetric analysis revealed no significant weight loss below 150 °C, indicating good thermal stability. X-ray diffraction studies confirmed the amorphous nature of the polymers due to disrupted chain packing. Overall, the study demonstrates that incorporation of naphthalene, amide, and ether linkages provides a balanced combination of thermal stability, solubility, and processability.

Keywords: Aromatic Polyesters; Naphthalene Moiety; Amide Linkage; Thermal Stability; Interfacial Polycondensation

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING BACTERIAL PIGMENT FOR EFFECTIVE ANTIMICROBIAL ACTIVITY

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Abstract:
The emergence of multidrug-resistant (MDR) microorganisms has intensified the demand for novel, eco-friendly antimicrobial agents. Silver nanoparticles (AgNPs) have gained considerable attention due to their broad-spectrum antimicrobial activity; however, conventional chemical synthesis methods often involve toxic reagents and harsh conditions. In this context, the present study focuses on the green synthesis of silver nanoparticles using a bacterial pigment as a sustainable, cost-effective, and biologically compatible alternative.
The bacterial pigment, produced by a pigment-producing bacterial strain, serves as both a reducing and stabilizing agent for the synthesis of AgNPs, eliminating the need for external chemical reducers. The synthesis process was carried out under ambient conditions, highlighting its environmental friendliness. The formation of AgNPs was initially confirmed by a characteristic surface plasmon resonance peak using UV–Visible spectroscopy. Further characterization was performed using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups involved in nanoparticle stabilization, while particle size, morphology, and distribution were analyzed using techniques such as X-ray diffraction (XRD), dynamic light scattering (DLS), and electron microscopy.
The antimicrobial efficacy of the pigment-mediated AgNPs was evaluated against selected Gram-positive and Gram-negative bacterial pathogens, as well as fungal strains, using standard agar diffusion and minimum inhibitory concentration (MIC) assays. The biosynthesized AgNPs exhibited significantly enhanced antimicrobial activity compared to the pigment alone, indicating a synergistic effect between the bacterial pigment and silver nanoparticles. The nanoparticles demonstrated effective disruption of microbial cell membranes, leading to growth inhibition.
Overall, this study highlights the potential of bacterial pigment-assisted green synthesis of silver nanoparticles as a promising strategy for developing effective antimicrobial agents. The approach offers significant advantages in terms of sustainability, biocompatibility, and applicability in biomedical, pharmaceutical, and antimicrobial coating applications.

Keywords: Biosynthesis; Green Chemistry; Microbial Pigment; Silver Nanoparticles; Antimicrobial; Biomedical Applications.

SPATIAL VARIATION OF SOIL BACTERIAL AND FUNGAL COMMUNITIES ACROSS CONTRASTING LAND-USE SYSTEMS IN WESTERN MAHARASHTRA, INDIA

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Abstract:

Soil microbial communities play a pivotal role in regulating ecosystem functioning, nutrient cycling, and soil health across diverse land-use systems. The present study assessed the diversity, composition, and distribution of soil bacterial and fungal communities across four contrasting habitats: agricultural land (Aini), grassland (Durgmanwad), flooded area (Turambe), and forest area (Dajiupur) in Radhanagari Taluka, Maharashtra, India. Soil samples were collected seasonally from February 2023 to January 2025 to capture spatial and temporal variability. Standard culture-based techniques were employed for microbial isolation and enumeration, while identification was carried out using peer-reviewed, open-access taxonomic keys and databases. Diversity indices, including species richness, the Shannon–Wiener index, Simpson's index, and evenness, were computed using PAST software. The results revealed marked variations in microbial abundance and diversity among land-use types, with forest and grassland soils exhibiting higher bacterial and fungal diversity compared to agricultural and flooded soils. Seasonal fluctuations were evident, reflecting the influence of soil moisture, vegetation cover, and anthropogenic inputs on microbial community structure. Overall, the findings underscore the sensitivity of soil microbial communities to land-use practices and environmental conditions, highlighting their value as indicators of soil ecological status. This study provides baseline data for the region and contributes to a better understanding of soil microbial dynamics in tropical landscapes.

Keywords: Bacterial Diversity; Fungal Communities; Land-Use Types; Soil Ecology; Tropical Soils.

TOXICOLOGICAL EFFECTS OF SUB-LETHAL ISOPROTURON ON NEUROBEHAVIORAL AND MORPHOLOGICAL ENDPOINTS IN *CYPRINUS CARPIO* (L.)

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Abstract:

Isoproturon is a commonly used urea-based herbicide in cereal crop production and frequently reaches aquatic environments through agricultural runoff, where it can adversely affect non-target freshwater organisms. This study examines the behavioral and morphological responses of *Cyprinus carpio* (L.) fingerlings following sub-lethal exposure to Isoproturon (75% WP). Acute toxicity evaluation conducted over 96 hours using a semi-static bioassay established the median lethal concentration (LC_{50}) at 0.140 mg/L. Based on this value, two sub-lethal concentrations 0.0224 mg/L (1/7th of LC_{50}) and 0.0112 mg/L (1/14th of LC_{50}) were selected for subacute exposure trials lasting 1, 7, and 14 days, followed by a 7-day recovery phase in herbicide-free water. During the exposure period, the fish displayed significant behavioral abnormalities, including erratic and rapid swimming, heightened activity, loss of balance, and increased bottom-dwelling behavior. Observable morphological alterations included caudal curvature, changes in body pigmentation, and ocular deformities. Although mortality was recorded at the tested sub-lethal concentrations, the observed disturbances indicate marked neurotoxic effects. These effects are likely associated with acetylcholinesterase (AChE) inhibition, resulting in excessive accumulation of acetylcholine (ACh) at synaptic junctions and subsequent over stimulation of neuromuscular systems, leading to impaired neural signaling. Importantly, the persistence of both behavioral and morphological impairments beyond the recovery period suggests prolonged neurotoxicity and limited physiological recovery. Overall, the results demonstrate the ecological threat posed by Isoproturon contamination in freshwater ecosystems, particularly those influenced by agricultural runoff, and emphasize the need for effective regulatory frameworks and continuous environmental monitoring to minimize its adverse impacts on aquatic life.

Keywords: Isoproturon, LC_{50}, Behavioral Responses, Morphological Deformities, Neurotoxicity, Agricultural Runoff.

HUMAN-INDUCED IMPACT ON SACRED GROVES OF KOLHAPUR DISTRICT, MAHARASHTRA

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Abstract:

Sacred groves are natural landscapes, traditionally protected by the local communities due to socio-religious considerations. These landscapes are undisturbed and preserved forest patches dedicate on the name of deities and ancestral sprites, therefore it serving as vital reservoirs of biodiversity. In the present study, field surveys were conducted in five sacred groves of Radhanagari Tehsil, Kolhapur District, Maharashtra during January–May 2024. The surveys revealed that, the sacred groves such as Bujhavade, Wakighol, Bhaire and Hasane were severely impacted by various human activities which damaging the ecological integrity of sacred groves. We noted serious human-induced disturbances like tree cutting, fuelwood collection, construction activity (road, renovation of temple), cattle grazing, agriculture encroachment, tourism and celebration of social and religious events. These illegal and unregulated human activities in and around sacred groves landscapes have resulted in significant loss of biodiversity, progressive shrinking of grove size moreover the weakening of their socio-rituals and cultural values. Moreover, these activities also affect the fauna of sacred groves by causing overexploitation of natural resources and loss in available foraging and nesting sites. From the present study, we concluded that, due to their high ecological and social significance, sacred groves require urgent protection from illegal and unregulated human interventions. Furthermore, the immediate implementation of effective management and conservation strategies is essential to safeguard these natural heritage sites.

Keywords: Human Activities and Its Impact, Sacred Groves, Radhanagari Tehsil, Klhapur.

ZOOPLANKTON DIVERSITY IN MIDIGESHI LAKE, TUMAKURU DISTRICT, KARNATAKA, INDIA

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Abstract:

Zooplanktons are the microscopic free-floating organisms prevalent in freshwater ecosystems, play a pivotal role in maintaining ecological balance. They facilitate energy transfer from primary producers like phytoplankton to higher trophic levels, including large fish, while simultaneously recycling essential nutrients and exerting grazing pressure on algal blooms. Zooplankton communities serve as vital indicators of water quality and ecosystem health. The present study was conducted from February 2023 to January 2024 at Midigeshi Lake, located in Tumakuru District, Karnataka, India, to assess zooplankton diversity, abundance, and density dynamics. Species identified by using taxonomic keys outlined by Battish (1992), Needham and Needham (1962), and Altaff (2004). The survey documented 22 distinct taxa distributed across four major taxonomic groups: Rotifera (9 species), Cladocera (6 species), Protozoans (3species), Copepoda (2 species), and Ostracoda (2 species). Rotifers emerged as the dominant group, demonstrating remarkable resilience amid fluctuating environmental conditions, likely attributable to their parthenogenetic reproduction and broad tolerance to physicochemical stressors. Zooplankton density exhibited significant positive correlations with key water quality parameters, including pH, temperature, dissolved oxygen, turbidity and nutrient loads. These parameters were markedly elevated due to anthropogenic pressures, such as agricultural runoff laden with fertilizers and pesticides alongside untreated domestic sewage from adjacent human settlements. To mitigate these risks, urgent implementation of sustainable conservation measures is recommended, encompassing routine physicochemical monitoring and community-driven restoration efforts. This study not only highlights the zooplankton assemblage as a barometer for freshwater health but also advocates for interdisciplinary research integrating limnology to ensure the long-term viability of Midigeshi Lake as a critical resource for local fisheries, irrigation and recreation. Future investigations are needed to know predator-prey interactions and climate change impacts for holistic lake management.

Keywords: Zooplankton, Midigeshi Lake, Rotifera, Temparature, Pesticides, Conservation, Climate Change.

NANOTECHNOLOGIES PROMISE TO BE FOUNDATION OF INDUSTRIAL REVOLUTION

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Abstract:

Most of the electronics industry is dependent on the ever-decreasing size of lithographic transistor.It seems to be promising successor to lithographic based ICs.American Society of Mechanical Engineers said that nanotechnology will leave virtually no aspect of life untouched is an excepted to be in widespread use by 2020.Nanoelectronics improving display screens on electronics devices, It reducing the size of transistors used in an Integrated system, It is special issue focus on blossoming field of flexible electronics by using nanotechnology. Flexible electronics is a new trend in electronics industry to handle the increasing burden on chips. This is technology which simplifying electronics circuits by electronic devices on flexible plastic substrates. Flexibles materials can be used to make conformal electronics that stuck on fabric, skin, walls and windows. Fabrication cost of manufacturing flexible electronics is cheaper than lithographic fabrication. Stretchable electronics or flexible electronics is likely to future of mobile electronics. Potential applications include wearable electronic devices, biomedical uses, compact portable devices, and robotic devices circuits. Nanomaterials in terms of performance, solution processability and processing temperature requirements, which makes them very attractive for flexible electronics. This technology is being used in number of application due to benefits light weight, favourable dielectric properties and high circuit density.

FABRICATION OF TRANSPARENT AND SUPERHYDROPHOBIC PDMS – SILICA COATINGS FOR SOLAR CELL COVER GLASS

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Abstract:

Solar photovoltaic (PV) panels are continuously exposed to environmental contaminants such as dust, dirt, and airborne debris, which obstruct incident sunlight and significantly reduce power generation, necessitating frequent cleaning, particularly in arid and semi-arid regions. Additional factors, including bird droppings, extreme climatic conditions, and saline coastal atmospheres, can further accelerate surface degradation and corrosion, leading to long-term performance losses. In this work, we report the development of an advanced transparent superhydrophobic coating fabricated by spray deposition of a hydrophobic silica sol (HSS)–polydimethylsiloxane (PDMS) suspension onto a glass substrate. To optimize the optical transparency and wetting characteristics, the PDMS concentration was systematically varied while maintaining a constant HSS content. The optimized coating exhibited high optical transmittance of 86.74% across the visible spectrum (400–800 nm), which is critical for photovoltaic applications. In addition, the coating demonstrated exceptional superhydrophobicity, characterized by a high water contact angle (WCA) of 165.14 ± 1.41° and an ultralow sliding angle (SA) of less than 1.33 ± 0.29°. Robust durability was confirmed through standardized adhesive tape, sandpaper abrasion, and chemical stability tests under varying pH conditions, indicating strong mechanical and chemical resilience. Moreover, the coating retained excellent self-cleaning performance under harsh environmental conditions, effectively repelling dust and surface contaminants. These results highlight the significant potential of the developed coating to protect solar cell surfaces from environmental fouling, moisture ingress, and pollutant-induced degradation, thereby enhancing device longevity and improving overall energy harvesting efficiency for next-generation solar technologies.

Keywords: Superhydrophobic; Self-Cleaning; Solar Cell Cover Glass; Transparency; Contact Angle

SEDIMENT-MEDIATED TRANSFER OF HEAVY METALS TO AQUATIC BIOTA IN AN AGRICULTURALLY IMPACTED FRESHWATER SYSTEM

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Abstarct:

The paper determines how heavy metals are transferred through the sediment to the aquatic biota of a freshwater system subjected to agricultural activities. The agricultural runoff is a major contributor of pollution, which usually contaminates the water body with heavy metals. These metals are cadmium, lead and mercury, which may be attached on the sediments in the water bodies affecting their movement and bioavailability. The paper will discuss the importance of sediments in the transfer of such contaminants to aquatic life, especially based on food web. Water, sediment, and biota (fish and invertebrates) were sampled in an agricultural watershed, pesticides and fertilizers of which are common. Bioaccumulation studies have shown that some of the heavy metals including lead were effectively transferred onto the biota and particularly benthic organism, through sediment. The paper has identified the significance of the sediment properties, including the content of organic matters, and the size of particles in determining the movement of metals. Also, it highlights the potential threats to the aquatic ecosystems and human health by consuming the contaminated fish and other biota. The results emphasize the importance of ensuring that agricultural run offs are controlled through proper management practices to ensure that fresh waters are not contaminated with sediments-bound heavy metals that would lead to the degradation of the aquatic ecosystem and food safety.

Keyword: Heavy Metals, Bioaccumulation, Degradation, Aquatic Ecosystem

SYNTHESIS AND CHARACTERIZATION OF PURE $BIFEO_3$ AND COBALT DOPED $BIEFO_3$ MULTIFERROIC CERAMICS USING SOLUTION COMBUSTION METHOD (SCM)

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Abstract:

The pure $BiFeO_3$ and cobalt doped $BiFeO_3$ ceramic such as $BiFeO_3$, $BiFe_{0.9}Co_{0.1}O_3$, $BiFe_{0.8}Co_{0.2}O_3$ and $BiFe_{0.7}Co_{0.3}O_3$ samples were synthesized using the solution combustion method. The $BiFeO_3$, $BiFe_{0.9}Co_{0.1}O_3$, $BiFe_{0.8}Co_{0.2}O_3$ and $BiFe_{0.7}Co_{0.3}O_3$ multiferroic ceramic samples were made utilizing metal nitrates and glycine as essential precursors. The multiferroic samples $BiFeO_3$, $BiFe_{0.9}Co_{0.1}O_3$, $BiFe_{0.8}Co_{0.2}O_3$ and $BiFe_{0.7}Co_{0.3}O_3$ were all ground in acetone medium, calcined at various temperatures, and then pelletized. The X-ray diffractometer (XRD) studies revealed that, all the samples have single phase rhombhohedral perovskite structure. The room temperature ferroelectric and magnetic hysteresis loop evidenced the coexistence of ferroelectricity and magnetism in single phase in $BiFeO_3$, $BiFe_{0.9}Co_{0.1}O_3$, $BiFe_{0.8}Co_{0.2}O_3$ and $BiFe_{0.7}Co_{0.3}O_3$ samples. A variation of dielectric constant with respect to temperature in $BiFeO_3$, $BiFe_{0.9}Co_{0.1}O_3$, $BiFe_{0.8}Co_{0.2}O_3$ and $BiFe_{0.7}Co_{0.3}O_3$ceramics delivers a dielectric anomaly around 410, 435, 455 and 488°C which is a consequence of antiferromagnetic to paramagnetic phase transition (T_N).

Keywords: Multiferroics, $BiFeO_3$, Cobalt Dopant, Combustion, Applications.

EFFECT OF DIFFERENT SUPPLEMENTARY FOOD STUFF ON THE PROTEIN CONTENT AND SIZE OF SHELL IN MULBERRY SILKWORM

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Abstract:

Sericulture productivity largely depends on the nutritional quality of mulberry leaves fed to the silkworm (*Bombyx mori* L.). The present study investigates the effect of different supplementary food stuffs on larval growth, protein enrichment, and shell size of mulberry silkworm. Larvae were fed mulberry leaves supplemented with sugar syrup, maize flour, wheat flour, and soybean flour, while normal mulberry leaves served as control. Feeding was carried out from the third instar until cocoon formation under controlled laboratory conditions. Results showed a significant improvement in larval body weight in all supplemented groups compared to control. The average larval weight gain was highest in wheat flour supplementation (0.90 g), followed by sugar syrup (0.80 g), soybean flour (0.80 g), and maize flour (0.70 g), compared to control (0.67 g). Wheat flour supplementation showed a 34.3% increase in larval weight over control, indicating enhanced protein assimilation and improved shell formation. The study concludes that wheat flour is the most effective supplementary feed and can be used as a low-cost nutritional additive to enhance silk yield and cocoon quality.

Keywords: *Bombyx mori*, Supplementary Diet, Protein Content, Shell Size, Sericulture, Mulberry Silkworm.

SUSTAINABLE SYNTHESIS OF BISCOUMARIN DERIVATIVES USING FE_3O_4/BIOCHAR MAGNETIC NANOCATALYST

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Abstract:

Multi-component reaction is a unique source to develop selective biological scaffolds possessing diversity and complexity in agricultural and pharmaceutical areas. In recent time's biscoumarin derivatives have been attracted more attention due to their pharmacological as well as biological activities such as anti-bacterial, anti-fungal, anti-cancer, anti-coagulant, anti-HIV, anti-viral, and anti-oxidant activities. In Present work, a clean and efficient method has been developed for the preparation of multifunctional Biscoumarin derivatives by condensation of 4-hydroxycoumarin with aromatic aldehydes in the presence of a catalytic amount of biochar/Fe_3O_4 under ambient temperature condition. The structures of the final compounds were confirmed with the aid of FT-IR, ^{1}H NMR, and ^{13}C NMR spectroscopy. This catalyst obtained from renewable source, showed high catalytic activity with good to excellent yields of the desired products in short reaction times. High yields, short reaction time, easy work-up procedure and ambient reaction conditions are advantages of this procedure.

Keywords: Nanocatalyst; Biscoumarin; Biochar; Magnetic Nanocomposite; One-Pot Reaction

PLASTIC WASTE MANAGEMENT THROUGH CHEMICAL RECYCLING: RECENT ADVANCES AND FUTURE PERSPECTIVES

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Abstract:

The rapid growth in plastic production and consumption has led to an unprecedented accumulation of plastic waste, posing serious environmental and sustainability challenges. Conventional mechanical recycling methods are often limited by polymer degradation, contamination, and restricted applicability to mixed plastic streams. In this context, chemical recycling has emerged as a promising and versatile approach for effective plastic waste management. This review critically examines recent advances in chemical recycling technologies aimed at converting plastic waste into valuable chemicals, fuels, and monomers. Key chemical recycling routes, including pyrolysis, gasification, depolymerization, solvolysis, and catalytic cracking, are discussed with emphasis on their reaction mechanisms, operating conditions, product selectivity, and environmental impact. Recent developments in catalyst design, process optimization, and integration with circular economy principles are highlighted. The review also addresses major challenges such as high energy requirements, process scalability, economic feasibility, and environmental concerns. Furthermore, future perspectives are outlined, focusing on emerging catalytic systems, hybrid recycling strategies, and policy-driven implementation to enhance sustainability. Overall, chemical recycling presents a viable pathway for transforming plastic waste into value-added resources, thereby contributing to sustainable waste management and resource recovery.

Keywords: Catalytic Recycling, Solvolysis, Waste Valorisation, Thermochemical Conversion

GREEN AND EFFICIENT SYNTHESIS OF OXAZOLONES USING A LOW-TEMPERATURE TRANSITION MIXTURE (LTTM)

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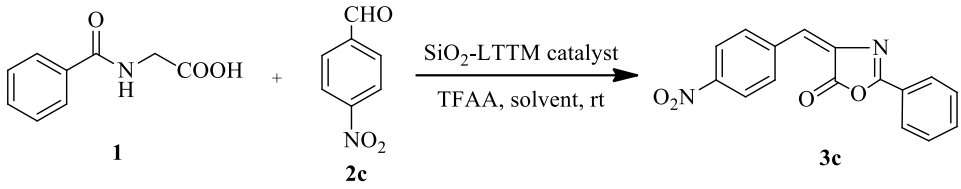
Abstract:

A low-temperature transition mixture (LTTM) possessing ionic liquid–like properties can be prepared from oxalic acid and L-proline in a 1:1 molar ratio. This LTTM has demonstrated considerable potential as an efficient alternative catalyst or promoter in numerous applications from a green chemistry perspective. Owing to its biodegradable, non-toxic, and water-soluble nature, the LTTM is being actively explored as an environmentally benign catalyst for organic synthesis. It can be readily employed under mild reaction conditions and exhibits high selectivity and reactivity across a broad range of substrates, making it an effective reaction medium for the synthesis of Oxazolones (3c).



Keywords: SiO_2-LTTM, Oxazolones

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