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on Recent Trends in Science and Technology

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Abstract Book



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GROUP A

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CHEMISTRY

METHOD DEVELOPMENT AND VALIDATION OF MIRABEGRON IN TABLET DOSAGE FORM BY HIGH-PERFORMANCE THIN LAYER CHROMATOGRAPHY

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A sensitive, accurate, precise selective and robust method in high performance thin layer chromatography has been developed for the estimation of Mirabegron. This method validated for Mirabegron in pure and pharmaceutical tablet formulation form. Solvent used was Methanol. In this method HPTLC aluminium plates pre-coated with silica gel 60F-254 are used as the stationary phase, and n-butanol: acetic acid: water (6:2:2 V/V) are employed as the mobile phase. The detection of TLC plates was done in absorbance mode at wavelength 249 nm. The R_f value was found to be 0.64. The linearity range of this method was 2-8 μg per band. Validation of this method was as per the ICH Q2 (R1) guidelines.

CLICK CHEMISTRY BASED SYNTHESIS OF TRIAZOLE MOIETY, ANTI-CANCER SCREENING AND MOLECULAR DOCKING

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Herein, we report the synthesis methodology and anticancer evaluation of 15 compounds using click chemistry approach. To develop a library of saccharin-1,2,3-triazole hybrid molecules via copper(I)-catalysed azide alkyne cycloaddition. Molecular docking studies indicated that alternative positions of saccharin-1,2,3-triazole hybrid molecules added a diversity to the potential hydrogen bonding interactions of these compounds with various amino acids. It revealed that derivatives of saccharine give the highest yield using CuAAC approach. Synthesised compounds showed a moderate anti-cancer activity against SK-OV-3 ovarian cancer cell line. Moreover, saccharin is also found in many clinically used agents. Recently, it is reported that N-formyl saccharin, a powerful formylating agent can be easily synthesized from saccharin, was used in formylation reaction. Moreover, docking study of synthesised saccharine derivatives gives beneficial information.

KEYWORDS: Saccharine, Substituted triazoles, Copper(I), Anti-cancer screening, Molecular docking, Click chemistry.

PYRAZOLE AND 1,2,3-TRIAZOLE-CONTAINING HETEROCYCLIC COMPOUNDS: SYNTHESIS AND BIOLOGICAL ACTIVITY

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We have created nitrogen-containing compounds because heterocyclic compounds exhibit good biological activity. Of these, 9a, 9c, 9e, and 9f have demonstrated excellent antibacterial action with notable inhibitory zones. N'-((5-chloro-3-methyl-1-phenyl-1H-pyrazol-4-yl)methylene) By condensation in acidic medium, 5-(aryloxy)-3-methyl-1-phenyl-1H-pyrazole-4-carbaldehyde and 5-methyl-1-phenyl-1H-1,2,3-triazole-4-carbohydrazide were converted into 5-methyl-1-phenyl-1H-1,2,3-triazole-4-carbohydrazide (9a-i, 10) and 5-methyl-1-phenyl-1H-1,2,3- From phenyl hydrazine and substituted anilines, respectively, 5-(aryloxy)-3-methyl-1-phenyl-1H-pyrazole-4-carbaldehyde and 5-methyl-1-phenyl-1H-1,2,3-triazole-4-carbohydrazide were produced. By using 1H-NMR, 13C-NMR, and mass spectroscopy techniques, all intermediates and final compounds were verified, and compound 9c was verified by a single XRD study.

ALUMINIUM AS A LIMITING FACTOR FOR THE GROWTH AND PRODUCTION OF COCONUT (COCOS NUCIFERA L.) IN SAURASHTRA REGION

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Cocos nucifera L. (Coconut palm) is known as the “tree of life” because of varied uses of all its parts. The growth of coconut palm depends on environmental conditions, availability of nutrients from the soil and water and the nutrients present in the leaves. In the present analysis, leaves of different varieties of coconut growing region of Saurashtra is taken, showing the effects of the essential nutrients required for the growth of plants. Using Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX) Analysis, the present study reveals particularly, the effects of Aluminium related to the growth of coconut palm. Based on the function of aluminium and its excess quantity, it limits the crop production on an acidic soil, damages roots system, which greatly reduces yields.

Keywords: coconut palm, aluminium toxicity, plant nutrients.

SYNTHESIS OF PYRAZOLE DERIVATIVES OF CHALCONE SCAFFOLD

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Pyrazoles are also a class of compounds that have the ring C₃N₂ with adjacent nitrogen atoms. Chalcone is an aromatic ketone and an enone that forms the central core for a variety

of important biological compounds. chalcones have been synthesised by Claisen-Schmidt condensation of substituted benzaldehyde and acetophenone. Pyrazole derivatives have been prepared in one pot by condensation of chalcone and hydrazine.

PREPARATION AND CHARACTERIZATION OF HYDROPHOBIC SILOXANE FILMS

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Films with organophilic nature are required for the separation of organics from aqueous effluents. In the present study we report preparation and characterization of such siloxane films. The films were prepared by crosslinking the siloxane precursor with polymer crosslinker or with silane with long hydrophobic alkyl chains. The microstructure morphology, hydrophobicity and other physico-chemical properties of the films were characterized by TEM, SEM, XRD, DSC, FT-IR etc. The films exhibited higher separation performance in the removal of dissolved organics from wasted water.

SYNTHESIS, CHARACTERIZATIONS, BIOLOGICAL ACTIVITY OF PD(II), NI(II), ZN(II), CU(II) METAL COMPLEXES OF QUINAZOLINONE SCHIFF-BASES

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Schiff base was obtained from the reaction between 2-amino benzohydrazide and 2-Hydroxy-4-methoxy benzaldehyde using the reflux method in HPLC grade methanol for 2 hours producing 71% yield. 2-amino benzohydrazide 2-Hydroxy-4-methoxy benzaldehyde schiff base was slight yellow color. The structures characterized by ESI-mass, Mass, ¹H NMR, IR, ¹³C NMR, the metal complex of quinazolinoneschiff base derivative were tested for antibiotics such as Streptomycin, Ampicillin and Nystatin. Metal complexes of Ni, Zn, Cu, and Pd were prepared in which Ni metal complex and Pd metal complex are highly potent drug that inhibit only gram-negative bacteria. All the metal complexes are able to inhibit gram negative bacteria. Zn and Cu metal complexes are effective broad-spectrum drug which can inhibit the growth of both gram-positive and gram-negative bacteria. All the metal complexes exhibited antifungal activity. Among them, Pd metal complex is most potent antifungal drug.

A GREENER SYNTHETIC APPROACH TOWARDS THE SYNTHESIS OF COPPER (II) AND ZINC (II) COMPLEXES CONTAINING BARBITURIC ACID MOTIF

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In current context, a greener synthesis has been developed for the synthesis of Copper (II) and Zinc (II) complexes of Barbituric acid with the view of their diverse therapeutic properties. A greener synthesis were developed by using Copper and Zinc complexes of Barbituric acid without use of any catalyst, acquired at a room temperature with the utilization of selenium metal as a part of ligand. The synthesis is carried out using ethanol as a solvent with an affordable yield. The synthesized compounds were characterized by various instrumental techniques viz. IR and Mass spectrometry.

SYNTHETIC BIOLOGICAL EVALUATION AND MOLECULAR DOCKING OF SOME NEW GLYOXYL AMIDE DERIVATIVES CONTAINING INDOLENUCLEUS”

An efficient Synthesis of a novel series of 1-benzyl-3-(substituted secondary amine-2-oxoacetyl)-1H-indole-2-carboxylic acid(4a-j) was accomplished from 1-benzyl-1H-indole-2-carboxylic acid, oxalyl chloride and secondary amine and few amounts DCM with 0 to 30°C after half and hrs the product obtained. All the recently synthesized compounds were characterized by the Mass, IR, ¹H NMR and mass spectroscopic techniques and by elemental analyses. Docking was done by the autodock program. The newly synthesized compounds were assessed for their antibacterial and antifungal activity.

Keywords :- 1-benzyl-1H-indole-2-carboxylic acid, oxalyl chloride, secondary amine and Dichloromethane (DCM).

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COMPUTER APPLICATIONS

CYBER EYES

Hiral Tolia , Parth Maru, Hussena Sham and Heena Vasvani

Christ College, Rajkot

The rapid developments of technology have provided huge areas of new opportunity and potential sources of efficiency for organizations of all sizes. These new technologies have also brought unprecedented threats with them. However, multimedia editing tools can be used to efficiently and seamlessly alter the content of digital data, thus compromising the credibility of information. Cyber security defined as the protection of systems, networks and data in cyberspace to preserve the original data and to remove all doubt about genuineness. In business this is a critical and challenging issue in the cyber world. Cyber security will only become more important as more devices will get linked with the internet. This paper focuses on types of cyber security, types of vulnerabilities and cyber threats techniques, techniques to avoid threats. Finally ends up with advantages of cyber world cyber-attacks can have military or political purposes. Some of these damages are: PC viruses, knowledge breaks, data distribution service (DDS) and other assault vectors. To this end, various organizations use various solutions to prevent damage caused by cyber-attacks. Cyber security follows real-time information on the latest IT data. Standard security frameworks are discussed with the history and early-generation cyber-security methods. In addition, emerging trends and recent developments of cyber security and security threats and challenges are presented. It is expected that the comprehensive review study presented for IT and cyber security researchers will be useful.

Keywords: Hacking Concepts and types, Malware, Types of Attack, Tools, Toolkit, Net

CYBER-PHYSICAL SYSTEM

Darshan Parekh

Gandhi gram-2a, Nanavati chowk, Rajkot

A cyber-physical system (CPS) or intelligent system is a computer system in which a mechanism is controlled or monitored by computer-based algorithms. Mobile cyber-physical systems, in which the physical system under study has inherent mobility, are a prominent subcategory of cyber-physical systems. A challenge in the development of embedded and cyber-physical systems is the large differences in the design practice between the various engineering disciplines involved, such as software and mechanical engineering. The US National Science Foundation (NSF) has identified cyber-physical systems as a key area of research.

Keyword:-Cyber-physical system, mobile cyber-physical systems , NSF, Design.

DARK SIDE OF THE DARK WEB

Rohan Asodariya, Parth Maru and Isha Velani
Christ College, Rajkot

The Internet has two main segments-“Surface Web” and “Deep Web”. Surface Web includes all the websites that are indexed and available to the general public where as the web pages which are not indexed come under the category of deep web. However, the gravest part of the Deep web is the Dark web. The Dark web is the concealed content of the World Wide Web. It requires specialized software, authentication and some configuration to access. TOR(The Onion Router) is a multilayer encryption technique which provides secrecy and privacy to the user. Many researches and surveys investigated that a majority of internet users consider Deep Web and Dark Web as the same thing. In order to demystify the same and provide a structural analysis of the Internet, this paper sheds light on the current composition of the Internet and the portion of the World Wide Web held by surface web, deep web and the dark web. It also discusses how the dark web is different from the deep web, mechanism of accessing the deep web, to browser and the cause of the dark web, silk road, black market, cyber arms the real deal, list of hidden service.

Keywords: The dark web, Deep web, Encryption, TOR, Silk Road, Privacy, black market, Cyber arms.

THE IMPACT OF IOT IN DATA SCIENCE

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IOT or Internet of Things is a field where the concept of transferring data to other beings or objects or things without human-to-human or human-to-computer interaction. Data Science is a field where raw data is analyzed and an insight is given based on the analysis. In this presentation we will explore how data science is applied along with IOT to change the way we live in present as well as future. We will see what is IOT and Data Science, then how are they applied together and finally some pros and cons that they bring with them.

Keywords: Internet of Things, Data Science, human-to-computer interaction

UNLEASHING THE POWER OF CHATGPT: AN AI-POWERED LANGUAGE MODEL

Yash Khakhar, Richa Kanabar and Tirth Unadkat
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GPT (Generative Pretrained Transformer) is an advanced language model developed by OpenAI. It is trained on a massive amount of text data, allowing it to generate human-like text and perform various language tasks, such as language translation, text summarization, and question answering. GPT is based on the Transformer architecture, which was introduced in the paper “Attention Is All You Need” by Vaswani et al. The Transformer architecture allows GPT to process input sequences in parallel, improving its processing speed and accuracy. GPT’s large number of parameters (175 billion), combined with its advanced

training method, allows it to generate high-quality text that is coherent, contextually, and in some cases, indistinguishable from text written by a human. However, like all AI models, GPT has limitations, including a lack of understanding of context and reasoning abilities, potential for personal bias, and privacy concerns. In summary, GPT is a highly advanced language model that has the potential to revolutionize natural language processing and make it easier for developers to build AI applications that can understand and generate human-like text.

Keywords: ChatGPT, AI language model, Advanced training method, Trained on 175 billion parameters.

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MATHEMATICS & STATISTICS

LINEAR CORRELATION AND LINEAR REGRESSION

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The present review introduces statistical tool of analyzing the relationship between two quantitative variables. Types of correlation and methods explained thoroughly. Coefficient of determination is also one part of it. Calculation and interpretation of correlation coefficient and the linear regression equation are discussed. Common misuses of the techniques are considered. Intervals for the parameters and failures are highlighted.

LINEAR REGRESSION AND IT'S IMPLICATIONS ON SHARE MARKET

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Linear regression is a linear approach for modelling the relationship between a scalar response and one or more explanatory variables (also known as dependent and independent variables). In simple words, Linear regression analysis is used to predict the value of a variable based on the value of another variable. Share Market is a platform where investors come together in order to carry out trades. The prices of shares are determined based on the demand and supply of shares. One of the major factors affecting the prices of shares is the past performance of the company and its shares. Therefore, this paper depicts the implication of Linear Regression on the prices of shares of Tata Motors and HDFC Bank and the future prices of the same are determined.

POLYCYSTIC OVARY DISEASES (PCOD) V/S POLYCYSTIC OVARY SYNDROME (PCOS)

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The present study experimentally investigated the effect of hectic and modern lifestyle in women's body which has increased the statistical percentage of women suffering from the problem of PCOD or PCOS. PCOD (Polycystic Ovarian Disease) is a medical condition in which the woman ovaries produce immature or partially mature eggs in large numbers and over the time these become cysts in ovaries. PCOS (Polycystic Ovary Syndrome) is a metabolic disorder in which the woman affected by hormonal imbalance in their reproductive years (between ages 12 and 51). PCOS is a serious medical condition, and it requires proper medical attention or surgical treatment. This research paper derives the basic symptoms, cure, statistics, cause of PCOD and PCOS and hence difference can be derived.

NETFLIX'S PREDICTIVE ANALYSIS

Jay Vasani and Smit Vachhani

Narayana Business School, Ahmedabad and Christ Institute of Management, Rajkot

Netflix utilizes predictive analytics to give personalized suggestions, but how exactly? Netflix is continuously gathering information. Netflix's powerful analytics engine uses AI-powered algorithms to identify what the user might be interested in seeing next based on the user's watch history, search history, demographics, ratings, and preferences. Whenever you access Netflix, it identifies a pattern based on titles, such as their genre, categories, actors, release year, the device used to access, how long the user watched a title, and time of day the user watched it. Based on that data it recommends users, similar tastes & preferences in the same genre that other users also watched or related to. All of these pieces of data are used as inputs that Netflix process in its algorithm to choose titles within the row and then ranks the rows using algorithms and complex systems to provide a personalized experience. The success of House of Cards is a great example of how big data can be used to make multi-million dollar decisions with a high degree of confidence. In a similar manner, data driven decisions can give organizations new opportunities not previously recognized. When I first heard about House of Cards, I was hearing how rapidly it was gaining popularity among viewers. One afternoon I decided to give it a go and after the first episode, I was hooked. Netflix knew I never had a chance.

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PHYSICS AND ELECTRONICS

STRUCTURAL AND RAMAN ANALYSIS OF PURE AND COMPOUND CRYSTAL OF MAGNESIUM SULPHATE HEPTAHYDRATE AND THREONINE

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Pure crystal of magnesium sulphate heptahydrate, threonine and their compound crystal were grown by slow solvent evaporation technique at room temperature. Square and needle shaped, colorless and transparent crystals were obtained after a period of 4 to 5 weeks. To prepare compound crystal, a reaction between magnesium sulphate heptahydrate and threonine was confirmed through TLC test for a definite molar ratio of the solutions. The formation of compound crystal was confirmed by structural analysis and Raman spectroscopic analysis. The structural analysis was carried out by Powder X software. This analysis showed the presence of both the phases of MSH and THR in the compound crystal. Raman spectrum of compound crystal showed the presence of characteristic vibrations of sulphate as well as of threonine.

n-n JUNCTION BASED SEMICONDUCTING ZnO/La_{0.3}Ca_{0.7}MnO₃/SrTiO₃ HETEROSTRUCTURES AND ITS MAGNETIC STORAGE STUDIES

Nisarg Raval¹, D. Venkateshwarlu¹, Himanshu Dadhich¹, Bhargav Rajyaguru¹, Sukriti Hans², M. Ranjan², R. Venkatesh³, V. Ganesan³, P.S. Solanki¹, and N.A. Shah^{1,*}

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The semiconducting n-n junction based ZnO/La_{0.3}Ca_{0.7}MnO₃/SrTiO₃ (ZnO/LCMO/STO) heterostructures were grown with different thicknesses of the LCMO layer using Chemical Solution Deposition (CSD) method. The investigations on the structural phases using X-ray diffraction (XRD) confirms the single phasic nature of LCMO and ZnO without any other impurities. The atomic force microscopy (AFM) was carried out to study the surface morphology for all three heterostructures and also quantitative topographic studies of rms surface roughness, granular profile analysis and grain size distribution were undertaken. Also, the temperature-dependent resistivity measurements were performed with varying applied magnetic fields in order to understand the responsible charge transport mechanism across the interface of ZnO/LCMO and the LCMO manganite channel. These transport measurements were conducted under two different modes, Current Perpendicular to Plane (CPP) mode for the interfacial measurements and the Current in Plane (CIP) mode for channel layer studies. The $\rho(T)$ measurements confirm the semiconducting behaviour under both CPP and CIP modes thoroughly which can be understood by Mott type Variable Range Hopping (VRH) model with the field-dependence of charge carrier localization length. In order to support and confirm the applicative side of this prototype for the data storage purpose, the Magnetoresistance measurements validates the negative Magnetoresistance (MR) with its sensitivity towards the applied magnetic field, channel layer thickness and temperature.

EFFECT OF BALL MILLING ON CEMENT AND FLYASH MATERIALS

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Concrete is a widely used material to make structures from buildings to factories, from bridges to airports even now and will continue to be in the future. It's one of the most studied materials of the 21st century. The Class F fly ash and Portland cement have been subjected to high energy ball milling and converted into nano structured material. Due to increase in population and the boom in technology there is an urgent need to improve the strength and durability of concrete. The nano structured fly ash and cement are characterized for size by particle size analyzer (PSA). Significant reduction in the size of particles has been observed. The structure and microstructure studies will be done by X-ray diffraction and SEM and functional phase changes will be studied using FTIR analysis

DAMPING OF A MICROWAVE RADIATION USING VARIOUS KIND OF CONDUCTIVE COATINGS AND FOILS TO REDUCE THE HARM CAUSED TO LIVING ORGANISMS

**Drashti Amrutiya¹, Riddhi Chauhan¹, Bhargav Rajyaguru¹, Davit Dhruv¹, A.D. Joshi²,
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We are living in the era of electronic gadgets with numerous developments in IoT (Internet of Things) to ease the process of human intervention. To operate these wireless devices, different types of microwave communication technologies are used. One of them is cellular internet connection. Smartphone nowadays uses frequency band from 0.7 to 2.7 GHz radio frequency radiation (RFR). Some reports have suggested the diverse effect on human, birds and bees when high intensity of such radiation is imparted to them. Our study focuses on the simple yet informative research on the reduction of microwave intensity using conductive coatings and foils. To study the effect, we have designed a faraday cage with acceptable size of window slot to introduce different metal foils as well as conductive coating. Smartphone application was utilized to measure the intensity of single microwave emitting source (ESP-01) kept inside the faraday cage which emits radiation of 2.4 GHz. Variation in intensity of the microwave source has been studied. We have observed the decrease in intensity of radiation with the distance and source. Increment in the thickness of a metallic foil at a fixed distance from the source results in damping of microwave radiation. Similar results have been observed when the thickness of a metallic foil is kept fixed and variation in distance between source and receiver was carried out. Different kind of flexible conductive coatings and foils in different shape and size have been utilized to reduce the harmful effects. A simple aluminium foil on back cover of the phone can drastically reduce the intensity. However, microwave cannot be blocked completely to use the wireless devices, still some kind of equipment can be fabricated to reduce and even completely block microwaves at certain places.

SYNTHESIS AND CHARACTERIZATION OF TiO₂ NANOPARTICLES

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The pure TiO₂ metal-oxide nanoparticles (NPs) were studied for a comprehensive analysis on its structural, micro-structural and electrical properties. The TiO₂ NPs were synthesized by easy and cost-effective sol-gel method. The structural and micro-structural properties of these nanoparticles were analysed by X-ray diffraction (XRD) spectroscopy and high-resolution transmission microscope respectively. XRD and HRTEM confirms the anatase structure of TiO₂ NPs and d-spacing correspond to (101) plane is 0.365 nm. Electrical properties of TiO₂ like dielectric, ac conductivity and impedance, characterized by LCR meter upto 2 MHz frequencies at various temperature range. The frequency dependence dielectric and ac conductivity variation show abnormal behaviour with temperature.

ESTIMATION OF VENUSIAN TEMPERATURE, PRESSURE AND DENSITY PROFILE USING REMOTELY SENSED RADIO OCCULTATION DATA

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Venus: The twin sister (as similar in size & density) of our home planet earth, closest planetary neighbor and the hottest planet of solar system, having much extreme atmospheric conditions such as 96.5% filled with CO₂, thick yellowish clouds of H₂SO₄ that traps heat and caused runaway greenhouse effect. Due to its complex nature and similarity with earth, it's always in interest of researcher. Understanding the Venusian atmosphere can give us more idea about how earth like planet can evolve in- time. In order to properly understand Venusian atmosphere, in-situ measurements & satellite remote sensing data plays crucial role, which can further help to accurately model the atmospheric profile. Following study dictate the temperature, pressure & number density variation from Radio science data which aims to determine the vertical structure of the Venusian atmosphere using radio occultation technique, which is achieved by using Ultra-Stable Oscillator (USO) on board Akatsuki launched by JAXA (Japan Aerospace Exploration Agency) on May 21,2010. Data contains total of 81 observed profile ranging over earth years 2016 to 2020, total of 26496 samples. Results include zonal & meridional-mean of temperature, pressure & Number density for altitude of 35km to around 100km above surface. Temperature, Pressure & Number density shows highest value of 448.9K, 523923.7 pa, 8.45E+25 (1/cm³) at around altitude of 35Km. At altitude below 45 km temperature shows high values which is 400K and above. As altitude increases the temperature, pressure & density shows drastic variation by decreasing the values. At geometric Altitude of 65 Km around latitude of 60 to 65 this observation depicts “cold collar – cold latitudinal band” in both hemispheres, which thought to be due to dynamics & latitudinal cold structures.

STUDIES ON STRUCTURAL, MICROSTRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF Mn₃O₄ NANOPARTICLES
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To lower the cost and make it eco-friendly sol-gel assisted wet chemical method is used to determine the presence of manganese in numerous oxidation states of Mn₃O₄ nanoparticles (NPs). The Mn₃O₄ nanoparticle are prepared by using Manganese acetate [C₄H₆MnO₄] as a precursor material. The prepared Mn₃O₄ nanoparticles (NPs) are characterized by X-ray powder diffraction (XRD) and crystalline size is measured using Debye Scherer's formula. Optical properties measured using UV-Visible spectroscopy (UV-Vis), morphology of prepared nanoparticles studied by High-Resolution Transmission electron microscopy (HRTEM), Frequency dependent electrical properties like dielectric, ac conductivity and impedance at different temperature are studied using high precision LCR meter.

STUDY ON ELECTRICAL PROPERTIES OF ZnO : CZO COMPOSITES

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Present communication deals with the preparation of pure ZnO and Cu_{0.9}Zn_{0.1}O (CZO) metal oxide nanoparticles and their composite (ZnO:CZO) with 50:50 wt% ratio. Structural and electrical properties were performed by using X-Ray diffraction (XRD) and impedance spectroscopic measurements at room temperature. Rietveld refined XRD pattern verify the structure quality of all the three samples. Upon mixing the two ZnO: CZO oxides, dielectric constant is found to quality of increase as compared to pure ZnO. Dielectric behaviour and related relaxation processes have been understood by using universal dielectric response (UDR) model. Mixing of CZO with ZnO has enhanced the conductivity and reduced the impedance throughout the frequency CZO with ZnO has enhanced the conductivity and reduced the impedance throughout the frequency range studied. Jonscher's Power Law has been employed to understand the condition mechanisms responsible for studied metal oxides and their composite.

STRUCTURAL AND OPTICAL PROPERTIES OF SOL-GEL GROWN COBALT FERRITE NANOPARTICLES EMBEDDED SILICA MATRIX

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Metal ferrite nanoparticles and their composites have been at the focus of research due to their diversified physical, mechanical, electrical, optical, catalytic and chemical properties. Such a class of material exhibits multitude of applicability in the field of biomedicines, catalysis, antimicrobial field, photocatalytic activity, environmental management, microwave devices, magnetic storage devices, magnetic resonance imaging, hyperthermia, gas sensor, etc. Cobalt ferrite nanoparticles dispersed in silica matrix were synthesized by sol-gel auto combustion method. Phase formation in the prepared samples was confirmed using XRD measurement. Lattice parameters obtained from Nelson-Riley method have been found to vary while decrement in density is observed. Various methods have been employed to determine the refractive index and the values show a parabolic nature following a reduction trend with increase in silica content. Among the other parameters, optical dielectric constant and dielectric susceptibility show a substantial reduction. The reflectivity, absorption coefficient, molar refractive index, molar electronic polarizability, reflection loss, polaron radius and optical basicity also show reduction with increase in silica matrix content. The present investigation has revealed that the optical parameters of cobalt nanoparticles can be tuned with dispersion in optimum silica content.

STRUCTURAL AND ELECTRICAL PROPERTIES OF BiFeO₃- Al₂O₃ MULTIFERROICS COMPOSITE

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Nano metal oxide based multiferroic composite have been prepared by wet chemical method. The nano multiferroics BiFeO₃ (BFO) and nano metal oxide Al₂O₃ (AlO) have been mixed together using the conventional solid state reaction method in different stoichiometric ratios (1-x) BiFeO₃ + (x) Al₂O₃ with (x = 0), (x = 0.10), (x = 0.20) and (x = 0.30). The structural properties of all the samples have been characterized by the X-ray diffraction (XRD) method. All the samples show a single-phase polycrystalline nature; there is no impure phase observed in the XRD pattern. The elemental analysis is done by energy dispersive X-ray analysis (EDAX), which reveals the element composition of all nanocomposites. The microstructural properties of all nanocomposite materials have been examined by field emission scanning electron microscopy

(FESEM). The nano-phase nature of BFO and AIO is demonstrated by FESEM images. The dielectric and loss were measured as functions of frequency from 20 Hz to 2 MHz in both the pure and matrix composite samples. Microstructure and weight percentage of AIO in the BFO phase have been used to explain changes in the material's dielectric properties. Jonson's universal power law $\sigma(\omega) = \sigma(d.c) + A\omega^n$ was used to fit the frequency-dependent ac conductivity data. The effects of defects, oxygen vacancies, disorder, and thermal energy on the overall electrical properties have been discussed.

OPTICAL PROPERTIES OF CaReN₃ SEMI-CONDUCTOR PEROVSKITE MATERIAL

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The band gap of CaReN₃, calculated using DFT-GGA-PBE, was found to be around 1.8 eV. The relativistic effects of the Re and Ca atoms significantly impact the band gap, which is typically underestimated by normal DFT calculations. In the range of UV, the CaReN₃ element used in optoelectronic devices due to its strong optical conductivity, low emissivity with high coefficient of absorption and raised refractive index. Less than the band gap energy it exhibits transparent behaviour due to the incoming photon not having enough energy to move electrons between valence band and conduction band. The reflectivity spectra of CaReN₃ show that it has higher reflectivity than other semiconductors, with the highest peaks occurring in the energy gap of 2.5 eV to 21 eV.

EFFECT OF SINTERING TEMPERATURE ON Dy DOPED BiFeO₃ KIRTI BERA*, DEVANG PANDYA, AMISHA THAKER, AKSHAY LILA, PRIYA

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The particular study is based on synthesis and characterization of Dysprosium (Dy)-doped bismuth ferrite Bi_{0.85}Dy_{0.15}FeO₃ (referred as BDFO) compound. A conventional solid-state reaction technique has been used to synthesize and sinter three samples at a temperature of 750 °C, 800 °C, 850°C. Structural analyses of three sample, taken by XRD data, observe that a single-phase compound having rhombohedral crystal structure. The average crystallite size and lattice strain has been calculated using Williamson-Hall plot method. Calculation and analysis of the dielectric data is measured in a broad range of frequency (1–1000 kHz) at a room temperature, and shows significant improvement in the dielectric properties (dielectric constant, dielectric loss) of Dy doped BiFeO₃ material. Enhancement of ferroelectric property due to increment in sintering temperature are confirmed in the prepared samples by the electrical polarization measurement (P-E).

STUDIES ON TRANSPORT PROPERTIES OF YMnO_3 THIN FILM DEVICE

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YMnO_3 perovskite rare-earth manganite demonstrate rich magnetic and electric phases, provides opportunities for next-generation multi-functional device applications. In this report, studies on structural and the nonvolatile bipolar switching of resistance in YMnO_3 thin films grown on n-type Si substrates by spin coating assisted wet chemical sol – gel method have been discussed. The structural properties of thin film were investigated by X-ray diffraction (XRD) method. The leakage current of the thin film was investigated at different frequencies. The device shows frequency-dependent resistive switching. Detailed analysis of the conduction mechanisms reveal that the migration of oxygen vacancies and the charge trapping/ detrapping at the heterojunction interface play effective and complementary role in the switching behaviors.

Keywords: Perovskite manganite, Thin film, Sol-gel method, Resistive switching

SYNTHESIS AND CHARACTERIZATION OF $\text{CdO} - \text{Al}_2\text{O}_3$ NANO COMPOSITE

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This research work on synthesis and characterization of nano micro composites, The CdO nano particles have been synthesised by sol gel assisted wet chemical methods and nano CdO have been added in Al_2O_3 micro material matrix using conventional solid state reaction method. The structural properties of the composite have been characterized by X- ray diffraction method, which reveal the phase and crystal structure of composite, the morphology of the samples have been characterized by scanning electron microscopy and crystallinity of the samples have been characterized by Transmission electron microscopy. The electrical properties of the samples such as dielectric property, and AC conductivity have been investigated using LCR meter at room temperature.

INVESTIGATION ON STRUCTURAL, MICRO-STRUCTURAL AND ELECTRICAL PROPERTIES OF TiO₂/Ag₂O NANO CORE/SHELL
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In this present work shelling of Ag₂O on TiO₂ core has been successfully synthesized by facile two step sol-gel and wet chemical method (green synthesis). The structural properties of the prepared nano core/shell has been carried out from X-ray diffraction measurement. The morphological studies of TiO₂/Ag₂O nano Core/Shell were analyzed by High Resolution Transmission Electron Microscopy (HRTEM) and elemental composition checked from Energy dispersive X-ray (EDX) with color mapping. The crystallinity of the sample was confirmed from Selected Area Electron Diffraction(SAED) image. For the investigation of electrical properties as ac conductivity, dielectric and impedance spectroscopy, the LCR measurement have been performed at different temperature with frequency range 20Hz to 2MHz.

Keywords: Core/Shell, EDX, Sol-gel, ac conductivity, Impedance spectroscopy.

STUDY ON MICROSTRUCTURAL AND PHOTOCATALYTIC PROPERTIES OF CARBON QUANTUM DOTS

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In this research work we have synthesized three different carbon quantum dots with different methods. The chemical information of the prepared samples have been investigated by FTIR spectroscopy, which ascribe that all the samples have similar chemical compositions. The elemental analysis of the sample analyzes by EDAX spectroscopy indicates that all sample have almost similar amount of carbon and oxygen in it. The microstructural information has been investigated by FESEM, which reveals the morphology of the samples. The photocatalysts property of the sample shows that the smaller particle size quantum dot possesses high photocatalysts activity as compared to other samples.

ORGANIC SOLAR CELL
Kubavat Harsh Bharatbhai
Aryatej B.Ed College, Morbi

Organic solar cell are the latest generation of photovoltaic cells. They contain one or several photoactive materials sandwiched between two electrodes. They can convert sunlight to electric energy effectively.

UV-VISIBLE SPECTROSCOPY
Parmar Amit Khimjibhai
Aryatej B.Ed College,, Morbi

Spectroscopy is often used in physical and analytical chemistry for the identification of substance through the spectrum emitted from or absorbed by them; spectroscopy is also heavily used in astronomy and remote sensing.

**FABRICATION AND DEMONSTRATION OF SUPER-HYDROPHOBIC
AND ANTIMICROBIAL FABRIC**

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Cotton has a tendency to get easily stained with food and drink spillage. Hence it requires frequent washing and also responsible for the growth of diseases causing pathogens owing to its absorbing nature. Current methods of preparing Superhydrophobic fabric involves the use of fluoro-alkyl chains which are hazardous to human health and the environment hence use of fluorinated coatings is banned in some countries. Here we have developed a low cost and simple method to fabricate Superhydrophobic and antimicrobial coating solution using polymers and metal nanoparticles. The coating process have been done using dip coating method. We have used silver nanoparticles in the preparation of coating liquid which will provide antimicrobial property to cotton fabric. The contact angle measurements of the prepared fabric have been performed. The coating is durable, can sustain high temperature and chemically stable. This cotton fabric can be used in variety of applications including hospitals, clothing and military uniforms.

Keywords: Super-hydrophobic, antimicrobial, coating

THE DIP COATING UNIT FOR FILM PREPARATION

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In the current technological era, researchers and industrialists use many types of coating methods to obtain a thin layer on a particular type of substrate. In this poster presentation, the idea of a dip coating unit has been considered for the same purpose. Dip coating is a low-cost non-vacuum method, which provides high uniformity of layer on the substrate with controlled thickness. Film formation takes place when the substrate is dipped into the solution and taken out for drying, by which we get a solid layer of the material formed on the substrate. The thickness of the film depends on the viscosity of the solution and the withdrawal rate of the substrate. In the current retail business, a sophisticated research-level dip coating unit is in the price range of Rs.1.05 lakh - Rs.4.53 lakh. For some institutes, this much amount of capital could be a deal-breaking factor. To counter this problem, we are currently working on the idea of manufacturing a low-cost dip coating unit for research-level purposes with manufacturing parts like a stepper motor, lead screw, Arduino, and so on. Arduino would be used to control the rate of dipping and withdrawing since the withdrawal rate is a crucial factor. These parts would be bought separately and assembled in the best way possible to achieve similar results as in an expensive dip coating unit. Considering the event of success, this product could be used by many researchers to execute the dip coating process at a low cost.

SYNTHESIS AND CHARACTERIZATIONS OF COPPER CADMIUM SULPHIDE (CuCdS₂) AS POTENTIAL ABSORBER FOR THIN FILM PHOTOVOLTAICS

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Synthesis and characterizations of copper cadmium Sulphide (CCS) thin films as potential absorber layer for low-cost thin films solar cells has been reported. Thin films of CCS were dip coated from clear molecular ink consists of copper acetate, cadmium acetate and thiourea dissolved in methanol. Films were heated at 200 °C in air for 15 minutes. The effect of film thickness on the compositional, morphological, optical and electrical properties were investigated using x-ray diffraction, Raman spectroscopy, scanning electron microscopy, UV-vis spectrophotometer and Hall measurement system. Optical band gap of the films estimated from the Tauc relation was found to be ~ 2.3 eV. Films are compact and void free having interconnected spherical grains. XRD and Raman spectroscopy confirmed the formation of hexagonal CCS without the formation of any secondary phases. The films are p-type and showed photoconductivity. Temperature variation of electrical conductivity of films measured in the temperature range from 300 to 475 K reveals nearest neighbor hopping (NNH) and thermionic emission (TE) over grain boundary (GB) barriers (GBB) below and above 400 K, respectively. Dip-coated CCS thin films found suitable for the fabrication of thin film solar cells at low cost.

Keywords: Absorber, Copper cadmium Sulphide, Optical properties, Raman spectroscopy, Electrical properties.

INVESTIGATIONS ON STRUCTURAL AND MAGNETIC PROPERTIES OF SOL-GEL GROWN NANO - MICRO COMPOSITES

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In the present research work, nano–micro composites have been taken in consideration for the studies. Nanostructured DyCaMnO₃ manganites were prepared by acetate precursor-based sol-gel technique and pure TiO₂ was used in its micron sized form. Composites were prepared by mixing in different weight proportions. Studies on the structural properties was carried out using x–ray diffraction (XRD) measurement which reveals dual phase nature of all composites along with an observed one impurity phase. Microstructure Properties And granular morphology of prepared nanocomposites were characterized from FESEM and HRTEM images. FESEM images reveals formation of uniform distribution of grains along with sharp grain boundaries and formation of particles with better crystallinity whereas information on crystal structure, crystallization and morphology have been understood from HRTEM images estimated particle size have been calculated from gaussian distribution fitting. For verifying compositional homogeneity and respected stoichiometry EDAX measurements have been carried out. Interlayer distances and angles between crystallographic planes have been measured from the position of lattice fringes and SAED patterns recorded in HRTEM characterization. For understanding the magnetic nature of all pure and their composite samples temperature dependent magnetic measurements have been considered on the basis of zero field cooled (ZFC) and field cooled (FC) measurement protocols which is recorded at an applied field of 100 Oe. Magnetic field dependent magnetization curve (M –H loop) is collected in the field range between ± 2 T at different temperatures of 5 K and 300 K.

UNDERSTANDING AND PREDICTING THE VARIATION OF PARTICULATE MATTER (PM_{2.5}) USING MACHINE LEARNING TECHNIQUES

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With increase in urbanization and industrialization, air pollution has now become a major issue for almost every country in the world. The hazardous air pollutants responsible for this problems should be measured at regular intervals with the ideas of reducing their effects on the environment. So such harmful parameters of air pollution must be evaluated for future references. Therefore in the following approach, machine learning algorithms were used to provide a more detailed analysis with respect to air pollution. The models like ANN, LSTM, MLR, RIDGE and LASSO were trained for predicting the concentration of PM_{2.5} using trace gases like NO, NO₂, NO_x, CO, SO₂ as it is considered to be a major air pollutants due its

dangerous properties which lead to adverse effect on the environment. These models were executed on the samples collected from Maninagar station, Ahmedabad for the time period of three years 2018-2020 which gave prediction of PM_{2.5} for 15 days (27 Nov-12 Dec). The predicted analysis was compared with the actual data using statistical techniques like- RMSE, MAE, MSE and R² which concluded that LSTM gave better estimated concentration of PM_{2.5} with respect to the other models.

FORECASTING PARTICULATE MATTER USING TIME SERIES MODELS

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PM_{2.5} is considered to be a major pollutant which is responsible for the degradation of Air Quality. Thus, analysis and study of PM_{2.5} should be of a foremost concern. The present study includes the PM_{2.5} data collected from Maninagar station in Ahmedabad for the year 2020. Time Series helps us to understand how PM_{2.5} evolves with time. Time Series models like Single Exponential Smoothing, Double Exponential Smoothing, Triple Exponential Smoothing, ARIMA and SARIMA were used for the analysis and prediction of the collected samples. These models were trained on the hourly dataset from January to November 2020 and were tested on December 2020 data. From the error analysis using RMSE, MSE, MAE and R² between the actual and predicted values of models, SARIMA was found to give accurate results. On comparison with the less fitted model ARIMA, SARIMA was 64.45%, Triple Exponential Smoothing was 59.52%, Double Exponential Smoothing was 50.19% and Single Exponential Smoothing was 48.02% better. As SARIMA showed best fitting, it was used to give the forecast for three days (1st January 2021 to 3rd January 2021).

TEMPORAL TRENDS OF CARBON MONOXIDE OVER AHMEDABAD FOR YEAR 2021

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Trace gases are major contribution in polluting the environment and plays a major role in climate change. Among these trace gases we have focused our study on carbon monoxide which is colorless, odorless gas which is generally produced from the incomplete combustion of carbon containing compounds. Carbon Monoxide (CO) poisoning can also lead to altered mentation, loss of consciousness and other symptoms. As per World Health Organization (WHO) the acceptable limit of carbon monoxide is 9 ppm for humanity over Ahmedabad. For you 2021 the variation of CO in the range 1.75 ppm to 0.3 ppm. The maximum CO is observed 1.75 ppm in winter season in the month of January and minimum value observed is 0.3 in pre monsoon season in the month of July. During special event like Diwali the value reaches its max 1.15 ppm compared to the average monthly value.

STUDIES ON VARIOUS PROPERTIES OF MANGANITE BASED NANOCOMPOSITES: EFFECT OF ZnO

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In this present research work, we report the results of various properties of chemically grown manganite based nanocomposites with different weight proportions (1) NdMnO₃:ZnO (100:0) (NMO) (2) NdMnO₃:ZnO (90:10) (NZ1) (3) NdMnO₃:ZnO (80:20) (NZ2) and (4) NdMnO₃:ZnO (70:30) (NZ3) in %. To investigate the structural properties, x-ray diffraction (XRD) measurement was performed which reveals orthogonal structure of NdMnO₃ whereas hexagonal wurtzite structure of ZnO without any detectable impurities. Microstructural analysis has been studied using scanning electron microscopy (SEM) and transmission electron microscopy (TEM) which has been discussed in the aspect of grain and grain boundaries. To further evaluate the effect of ZnO on the aspects of electrical properties frequency dependent dielectric constant (ϵ'), a.c. conductivity (σ) and Impedance (z) were studied at room temperature for all the samples using high precision LCR meter whereas, several theoretical models has been fitted and understood in the context of dielectric and a.c. conductivity behavior for all studied samples. Magnetic properties can be understood for all studies samples on the aspects of ZFC and FCC protocols. The electrical properties can be understood on the aspects of crystalline size, grain size and grain boundaries.

Keywords: Nanocomposites, Grains, Grain Boundaries, Electric Properties, Magnetic Properties

SMART MATERIALS

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Smart materials have the ability to respond to stimuli and environmental changes and to activate their function according to these changes. These stimuli may be temperature, pressure, electric flow, magnetic flow, light, mechanical, etc. and can originate internally or externally. It has the functions of actuator, sensor, self-healing and so forth, and are expected to be used not only as advanced functional materials but also as key materials to provide structures with smart functions. They tell the structure to alter its properties to prevent damage, optimize performance, correct malfunctions or alert users to a needed repair. A wide variety of smart materials exist, which includes piezoelectric materials, magneto-rheological materials, electro-rheological materials, shape memory alloys, etc. Smart materials find its applications in wide areas including aircrafts, computers, buildings, bridges, automobiles, etc.

TEMPERATURE DEPENDENT CHARGE CONDUCTION MECHANISMS ON MANGANITE-MANGANITE LAYERED STRUCTURE

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In this communication, we report the results of charge conduction mechanisms for the manganite-manganite based interface at LaMnO₃/La_{0.7}Ca_{0.3}MnO₃/LaAlO₃ bilayered heterostructure. The system was synthesized by a simple and low cost chemical solution deposition (CSD) method. XRD ϕ -scan measurement was performed at room temperature to determine the structural features and epitaxy of the LaMnO₃/La_{0.7}Ca_{0.3}MnO₃/LaAlO₃ heterostructure. XRD θ -2 θ shows the single phase nature of the material without detection of any impurity as well as epitaxial nature of this heterostructure has been confirmed. In order to determine resistive switching behavior, hysteretic I-V curves were recorded at different temperatures (80-220K) recorded for both the forward and reverse bias modes. I-V curve at room temperature (300K) shows the ohmic behavior. Furthermore, symmetric I-V curves were collected at different temperatures which get transferred to a linear in nature that shows decrease in intrinsic disorder at higher temperatures. I-V curves obtained for different temperatures have been fitted using Simmons model that can be understood in terms of the tunneling through disordered metal oxide state and spin-flip scattering mechanism.

A NUMERICAL STUDY FOR UNDERSTANDING SCHUMANN RESONANCE ON MARTIAN ENVIRONMENT

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Natural electromagnetic waves generated near the surface by electrostatic discharges in dust devils could be trapped in the resonant cavity formed by the surface and lower ionosphere of Mars. In this paper we have calculated one dimensional finite difference time domain technique to understand the Schumann resonance in the martian environment [1]. The study of the propagation of extremely low frequency (ELF) waves is essential for the electromagnetic sounding investigation planned for some of the future missions [2]. The extremely low frequency, i.e. 3-3000 Hz electromagnetic waves are weakly attenuated and can propagate around the globe producing global resonance. They are also generated by electric discharges in the planetary atmosphere [3]. The electric field and magnetic field in 1D can be obtained by the updated equation of time dependent Maxwell's equation.

FERROFLUIDS

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The first Ferrofluid was invented by a NASA engineer in early 1960s. His idea was that if you add magnetic nanoparticles to fuel, you can move it around in zero gravity with a magnetic field. His idea didn't work out as he wanted, but by this idea, Ferrofluid was invented. Since then, Ferrofluids are widely in use. Basically, Ferrofluid is a specific type of a metallic liquid which responds to a magnetic field. They are composed of nanoscale magnetic particles suspended in a carrier fluid. The solid particles are generally stabilized with an attached surfactant layer. Ferrofluids are extremely stable, meaning that they will not cluster together even in strong magnetic fields. They are widely in use due to their magnetic, electrical, chemical properties. In machine element design they are useful and applications of Ferrofluids are in biomedical and even in the thermal engineering field. Future of Ferrofluids has been predicted to be bright.

STUDIES ON PROPERTIES OF GREEN SYNTHESISED CuO/ZnO/PVA NANO POLYMER COMPOSITES

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In this research work ZnO nanorods and CuO nanoparticles have been synthesized using green synthesis technique. These nanorods and nanoparticles have been embedded in PVA polymer matrix in order to prepare PVA polymer nano-composite films using solution casting method. Four different polymer composite films have been prepared including pure PVA film, ZnO nanorods embedded PVA film, CuO nanoparticles embedded PVA film and CuO nanoparticles-ZnO nanorods embedded PVA film. The structural properties of all four films have been investigated using X-ray diffraction technique. The microstructure and morphology have been assessed by Field emission scanning electron microscopy (FESEM) while energy dispersive x-ray analysis has been employed to study the elemental composition of all four nanocomposite films. Optical properties of all the four films have been studied by UV-Visible spectroscopy. The electrical properties such as dielectric permittivity, ac conductivity and impedance have been studied as a function of frequency in the frequency range 20Hz to 2MHz at room temperature using LCR meter. It has been found that incorporation of nanofillers like ZnO nanorods and CuO nano particles enhance the optical and dielectric properties of PVA host matrix.

Keywords: Nano Polymer Composite, Nano Composite, Optical property, electrical property

STUDIES ON PROPERTIES OF Mn₃O₄/Ag₂O CORE SHELL NANOCOMPOSITES

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In this research work Mn₃O₄-Ag₂O core shell nanocomposites have been prepared by a two-step wet chemical method. In the first step Mn₃O₄ nanoparticles have been prepared by sol-gel method and in the second step Mn₃O₄-Ag₂O core shell has been prepared. X-ray diffraction analysis has been performed to study the structural aspects of Mn₃O₄-Ag₂O core shell nanocomposites. The crystallite size has been calculated using Debye-scherrer's formula. The morphology of the prepared core-shell nanocomposites has been investigated using high resolution transmission electron microscopy (HRTEM). Elemental composition has been studied using energy dispersive x-ray analysis (EDAX) while elemental colour mapping has been employed to get better insight into the distribution of elements in the sample. Electrical properties such as ac conductivity, impedance and dielectric permittivity have been studied in detail as a function of frequency in the range 20Hz to 2MHz at various temperatures. Cole-Cole relaxation equation has been fitted for the real part of dielectric permittivity at different temperatures. In order to know the possible conduction mechanism in the Mn₃O₄-Ag₂O core shell nanocomposites Jonscher's power law has been fitted at different temperatures.

Keywords: Nano composite, microstructural properties, dielectric, conductivity

INVESTIGATION ON WET CHEMICALLY SYNTHESIZED ZNO NANOROD AND ITS PROPERTIES

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In this research work we have synthesized crystalline nano rod by wet chemical method via sol gel method. The structural properties of the ZnO nano rod have been characterized by the x-ray diffraction method (XRD). XRD pattern shows a good crystalline nature of nano rod and does not show any impure phase in detectable range. The crystalline size of the nano rod has been calculated from XRD pattern using two different methods, Debye scherrer's and William hall plots. The microstructural properties have been characterised by high resolution transmission microscopy (HRTEM), microstructural images show uniform formation of nano rod growth and

have good crystalline nature, which also reflect on SAED images of the nano rod. The electrical properties such as dielectric, impedance and AC conductivity have been characterized at room temperature at 20Hz to 2MHz frequency range using high precision LCR meter, the frequency response of electrical property have been discussed in detail.

Keywords: Nanorod, sol gel method, microstructure.

INFLUENCE OF SINTERING TEMPERATURE ON TRANSPORT AND MAGNETIC PROPERTIES OF NANOSTRUCTURED $\text{La}_{0.5}\text{Nd}_{0.2}\text{Ca}_{0.3}\text{MnO}_3$ MANGANITES

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In the present communication, the structural, transport and magnetic properties of sol–gel grown nanostructured $\text{La}_{0.5}\text{Nd}_{0.2}\text{Ca}_{0.3}\text{MnO}_3$ (LNCMO) manganite sintered at different temperature (viz., 1000, 1100 and 1200°C). X-ray diffraction (XRD) patterns of all the samples were analyzed using Rietveld refinements and obtained structural lattice parameters have been discussed in correlation with magnetization of the samples. Transmission electron microscopy (TEM) measurements have been carried out to understand the particle size morphology. Resistivity behavior of all the samples exhibiting metal to insulator transition temperature (T_P) has been discussed based on grain morphology and role of oxygen. Magnetism of all the samples have been discussed on the basis of variation in ferromagnetic to paramagnetic transition temperature (T_C), double-exchange (DE)-interactions, oxygen vacancy, and freezing temperature.

Keywords: Perovskite manganite, Nano, Sol-gel method, Magnetization

UNDERSTANDING THE ANALOGY OF MODELLED AND SATELLITE OBSERVED VENUSIAN TEMPERATURE PROFILE

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When it comes to understanding our Planet's current state of climate and how it will evolve in time, it is necessary to take a look at surrounding similar planets like mars, Venus and many more. Among all of them, Venus is considered to be the most similar to earth in terms of its shape, size and structure. Venus helps scientists to model Earth's climate, and serves as a cautionary tale on how dramatically a planet's climate can change. In order to properly understand Venusian atmosphere, models, in-situ measurements and remote sensing data are very crucial due to their accuracy and predictability. The atmosphere of Venus has been observed for many decades by the European space agency, Venus express orbiter and more recently, Japanese mission Akatsuki. Also, some of the compiled and modelled data tools like

VIRA (The Venus International Reference Atmosphere), Venus Gram (Venus Global Reference Atmospheric Model) and VCD (Venus Climate Database) plays an important role in understanding Venusian atmosphere. The following study compares the modelled and compiled datasets with remotely observed satellite data to check reliability. Here we have used VIRA (compiled from pioneer & Venera mission), Venus Gram (engineering model compiled of Pioneer Venus orbiter, probe data, Venera probe data, Venus, Venus II, The Planet Venus, and several journal articles) VCD (derived from IPSL Venus General circulation model), radio occultation experiment (VeRA) onboard Venus Express and Ultra-Stable Oscillator (USO) on board Akatsuki data. The study uses a total of 32 profiles of Venus express, around 159000 samples from 39 km to 92 km altitude and 81 profiles from Akatsuki radio science data, around 26496 samples from altitudes of 35 km to 95 km. Corresponding modelled data was retrieved from Venus Gram, VIRA & Venus Climate dataset. Results contain variation of temperature with altitude over particular range of latitude from 0° to 30° , 30° to 60° , 60° to 90° and 0° to -30° , -30° to -60° , -60° to -90° . From the results, one can observe that for most of the altitude region, satellite data and modelled data follows the same trend, but for altitude below 50 km, Venus express data shows wide variability from the rest of the data. Also, in mesosphere, from altitude 60 km to 75 km and above 85 km, VCD shows higher temperature variation. Altitude range above 85 km shows more uncertainties in most of the presented datasets, for which the reason is unknown.

NOVEL APPLICATION OF NANOTECHNOLOGY

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Applications of nanotechnology are delivering in both expected and unexpected ways which promise to benefit society. In the energy sector, its application is in developing a new type of solar panels that incorporate nanoparticles to create lightweight, flexible solar cells. Future transportation benefits from the use of nanotechnology-enabled lightweight, high-strength materials would apply to almost all vehicles. Environmental remediation nanotechnology-enabled sensors and solutions are now able to detect and identify chemical or biological agents in the air and soil with much higher sensitivity than ever before. There are also a large number of medical and healthcare applications of Nanotechnology.

INVESTIGATIONS ON DEVICE FUNCTIONING CAPABILITIES OF $\text{La}_{0.9}\text{Sr}_{0.1}\text{MnO}_3/\text{SrNb}_{0.002}\text{Ti}_{0.998}\text{O}_3$ JUNCTION

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The current communication states a detailed investigation on device (junction) functioning capabilities for $\text{La}_{0.9}\text{Sr}_{0.1}\text{MnO}_3$ manganite thin film fabricated on $\text{SrNb}_{0.002}\text{Ti}_{0.998}\text{O}_3$ substrate. XRD ϕ -scan measurement has been performed to confirm the desired structural feature of the fabricated junction. Interpretation of device capabilities has been discussed with the aid of temperature dependent current-voltage (I-V) characteristics. The current ratio for specific voltages has been employed to study the linearity-non-linearity nature and temperature effect. At different temperatures, the logarithmic scale variations in forward bias current with applied voltage have also been studied. I-V characteristics at typical temperatures have been studied for forward and reverse currents, simultaneously, to identify the backward diode behaviour. Various theoretical model fits to support the conduction mechanisms in the device have also been studied for typical I-V characteristics. For the interpretation of conduction processes undergoing in the device, the field effect configuration based variation in junction resistance of LSMO/SNTO junction with temperature under applied different junction electric fields and temperature dependent variation in electroresistance (ER) have also been investigated.

Keywords: Manganite films; Transport Properties; Devices.

ELECTRICAL TRANSPORT CHARACTERISTICS OF BRASS/PYROGRAPHITE/CdSe THIN FILM/PLATINUM SANDWICHED DEVICES

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At room temperature (RT) (303 K), bulk cadmium selenide (CdSe) is thermally evaporated atop pyrographite substrates to synthesize thin films. A semiconductor characterization system was used to ascertain the transport characteristics of brass/pyrographite/CdSe thin film/platinum sandwiched devices. The resistance was high when the gizmo was in an amorphous phase; the opposition was low in a crystalline state. Resistive switching states created by an electric field aid in memory device formation. Scanning electron microscopy (SEM) has been used to

investigate the surface properties of CdSe films. Conductive filaments constructed at grain boundaries dominate the switching process based on electrical transport characterization and electron microscopy analysis.

Keywords: Amorphous thin film, cadmium selenide (CdSe), I-V characterization, switching characteristics, threshold voltage; conducting filament; grain boundary.

DEMONSTRATION OF PHYSICAL WEB CONCEPT FOR IOT USING UBIQUITOUS ESP32 WEB SERVER

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The Internet of Things (IoT) has the potential to revolutionize the way we live and work by connecting a wide range of devices and allowing them to share data. The use of internet of things (IoT) is rapidly increasing to solve real life problems. IoT and web technologies enable the user to deal with physical objects easily, digitally and more interactively. One of the key challenges in realizing this potential is making it easy for users to discover and interact with IoT devices. The Physical Web is a concept that aims to address this challenge. Physical web is one type of broadcast and discovery service in which a smart physical object broadcasts relevant information that nearby mobile devices can see or use to interact with that object. Here we present a study that demonstrates how the ubiquitous ESP32 based web server can be used for broadcasting and discovery of information i.e. the core of the physical web. The aim was accomplished by Using ESP32 microcontroller module.

Keywords: Physical web, IoT, bluetooth

AERODYNAMICS IN PLANES AND LAND VEHICLES

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Everyday we see the objects moving in this world. Some of them move on ground, some of them move in the air and rest of them in or on water. Especially for the objects moving on the surface or in the air, "Aerodynamics" is one of the factors which influence their motion. In this presentation we are going to discuss how planes fly in the air due its aerodynamics. Along with this we are going to discuss a little bit about aerodynamics influencing the motion of land vehicles. Lastly we are going to draw an analogy between aerodynamics of planes and motor vehicles.

GROUP B

13th National Science Symposium-2022 on Recent trends in Science and Technology
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BIOCHEMISTRY

UTILIZATION OF GREEN TEA EXTRACT AS NATURAL PRESERVATIVE FOR PEELED SHRIMP (*Metapenaeus affinis*) DURING REFRIGERATED STORAGE

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Shrimp is a type of shellfish that is found abundantly all over the world but is especially popular in the United States. According to (ITC) data, in 2021, the world's seven largest shrimp exporters exported a total of 2.57 million tons of shrimp products, an increase of 15% over the previous year. Shrimps now make up 67 % of India's seafood exports of \$7.8 billion, according to the Seafood Exporters Association of India (SEAI). This research has been used green tea as a preservative because it provides antioxidant properties and increases shelf life. Other preservatives are very dangerous & expensive but green tea is a natural preservative & cheap compared to other additives or preservatives & not make any adverse or harmful effects. Green tea, which is a highly well-liked beverage all over the world, is made by steeping *Camellia sinensis*. It has organic phenols and catechins, in which epigallocatechin - 3-gallate (EGCG) is present in catechins that are having antioxidants properties. That is a major component of green tea. The primary element preventing oxidation in the shrimp sample under experimental observation is catechin. There are 4 types of treatment in this research control (without GTE), 1% GTE, 2% GTE, and 3% GTE solutions that have already been prepared. After treatment samples have been observed for 7 days. In this research, some important quality parameters have been analyzed such as Colour, Freshness, pH, and Sensory quality analysis (Odour, Texture, Appearance, and Overall quality observed). This research found that 2% of green tea extract (GTE) treatments are the best because they show better results compared to other treatments.

Keywords: Shrimp, Green Tea Extract, Antioxidant, Shelf life

FOOD SECURITY AND AQUACULTURE

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The major way to raise the socio-economic standing of a nation and combat hunger is through improved food security. In underdeveloped nations, this issue is still evident in the present. Thus, the attention on human nutritional deficits centres on how crucial animal protein is to daily diets. In order to solve this issue, fisheries significantly increase the amount of animal protein in people's diets all over the world. The most affordable and nutrient-dense sources of protein are aquatic animals, which are also valuable food supplements for the poor by supplying vital vitamins, proteins, micronutrients and minerals. In the developing world, aquaculture is a key component of national economic growth and the world food supply. According to the Food and Agriculture Organization (FAO) aquaculture has the intensifying potential to achieve economic development goals for the nation and improve human welfare.

Keywords: animal protein, aquaculture, food security, global food security, malnutrition

COLCHICINE-INDUCED ENDOREPLICATION IN GARLIC (*ALLIUM SATIVUM*) CLOVES: 1. EXTRACTION OF RNA FOR DOWNSTREAM APPLICATIONS

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Garlic (*Allium sativum*) is an important culinary plant as well as a medicinal herb due to its ability to improve the taste of food and its antibiotic, antitumor, and anti-thrombin effects in animal cells. Colchicine is a mitotic division inhibitor and is widely used for the induction of endo-replication in plant cells. In this study, Garlic cloves were germinated for root induction in MS media for three days. After that, the cloves were transferred to colchicine containing MS media for 7 days. In this study, colchicine was used in various concentrations like 2.5mM, 5mM and 10mM to grow garlic cloves for endo-replication. These concentrations of colchicine could successfully arrest cells in the cell cycle, without entering into the cytokinesis. The cloves of garlic showed bulging at the root tips. After a growth of 10 days, root tips from all the concentrations were harvested for RNA extraction. The root tips grown in the MS media without colchicine for 10 days were used as a control. RNAs were extracted using standard protocols. Extracted RNAs of all the samples were checked on 1.2% agarose gel (in DEPC treated water) and PCR amplification was followed for each RNA samples for downstream applications.

Keywords: Colchicine, MS medium, endoreplication, cytokinesis, RNAs extract, downstream application.

UTILIZATION OF SHARK LIVER OIL IN PHARMACUETICALS

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Shark liver is extracted from targeted species include the deep-sea shark, basking shark and dogfish shark. Earlier fish liver's were considered as waste product and were discarded. Liver oil is an excellent source of vitamins A and D. It is a rich source of omega-3 fatty acids {Eicosapentaenoic acid (EPA), Docasahexaenoic acid (DHA)}, triglycerides, glycerol ethers, and fatty alcohols. Thus it is promoted as a dietary supplement used to boost the immune system, fight off infections and heal wounds. It also works really well to fight common problems such as internal and external inflammation and provides antioxidants. It is used in pharmaceutical as well as cosmetic industry.

Keywords: Shark Liver oil, omega 3 fatty acid (DHA & EPA).

EFFECT OF AEROBICS EXERCISE ON SELECTED BIO-CHEMICAL VARIABLE ON OVERWEIGHT GYM GOING PEOPLE OF RAJKOT CITY

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The purpose of this study was to find out the effect of varied aerobic exercises on selected biochemical variables among over weight gym going people in Rajkot city of Gujarat. To achieve the purpose of the study 60 male over gym going people from different area in Rajkot city were purposive-randomly selected as subjects and their age were 25 - 35 years. They were assigned into three groups, namely, experimental group and control group. Experimental group was experimented with regular gym going people and the control group was not given any experiment. The biochemical variables selected for this study were, total cholesterol, triglycerides, high density lipoprotein and low density lipoprotein. All tests were administered to all the subjects as per prescribed procedure. The paired mean and ANCOVA was used to analyse the data. The level of significance was set at .05. It has been observed from the analysis of given data and interpretation of findings that significant relationship was found between Experimental Group and Control Group of this study.

Keywords: Biological Variables, Aerobic, Over Weight

ROLE AND APPLICATION OF CURCUMIN AS AN ALTERNATIVE THERAPEUTIC AGENT IN PROSTATE CANCER

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I

Agriculture is the primary activity and a major contributor in economy and livelihood security in India. Medicinal rhizomes such as turmeric (*Curcuma longa*) is very important edible spices in India having many uses in medicines. Around 11 lakh tonnes per annum of turmeric is produced globally, out of which India alone dominates the world's production capacity of around 80%. *C. longa* is herbaceous herb cultivated mostly in tropical climate whose rhizome is frequently used as it contains curcumin that is a yellow colored polyphenolic plant product having diverse roles, such as it acts as an antioxidant, anti-inflammatory, anti-coagulant, anti-diabetic, anti-fungal, anti-bacterial, and anti-cancerous etc. Curcumin shows anti-cancerous property by attacking various cell pathways, transcription factors, cytokines, growth factors, causing apoptosis in the cells. The target of this poster is to analyze the traditional uses of curcumin and the various methods involved to find effective treatment of prostate cancer by using it alone or in combinations with other drugs. This review also covers the role of curcumin in preventing the progression of both androgen-independent and dependent prostate cancer by giving updates about various mechanisms leading to prostate cancer and how by targeting these pathways we can find different approaches to treat diagnose and prevent prostate cancer. Much research is needed to find treatments against CRPC (Castrate-Resistant Prostate Cancer) to form curcumin - metal complexes, nano-particles etc, so that they can be used in therapeutics.

Keywords: *Curcuma longa*, Curcumin, Anti-coagulant, Anti-bacterial and Prostate Cancer.

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BIOINFORMATICS

STRUCTURE PREDICTION AND ANALYSIS OF *DABOIA RUSSELLI* VENOM THROUGH A COMPUTATIONAL APPROACH

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Numerous animal species naturally produce chemicals to kill or incapacitate prey or defend against predators. Venom is a form of toxin secreted by an animal to cause harm to another. Numerous animal species naturally produce chemical toxins used to kill or incapacitate prey or defend against predators. Toxins can be classified according to the location of the body where their effects are most seen. Four different types of venoms will act on our bodies differently. Snake venom is highly modified saliva containing zootoxins which facilitate the immobilization and digestion of prey and defence against threats. Venoms contain over 20 different compounds, mostly proteins and polypeptides. *Daboia russelli* is a species of venomous snake in the family Viperidae. Common names are Russell's viper and chain viper. There is a total of 8 proteins found. Of the 8 proteins, 2 are also present in the human body. Antivenom used for the snakebite is mostly polyvalent snake antivenom. It is given to those who become ill after being bitten by an unidentified snake. It has been found that Russell's viper venom (RVV) in the presence of lipoid cofactor, clots the plasma of haemophiliacs and proconvertin. RVV is also nephrotoxic in vitro. The analysis and prediction are done with a retrieval of sequences and predicting 2D and 3D structure by GOR-IV and Swiss Model, respectively. The refinement of structure is also done with the help of various tools. The quality check of structure is also done for a protein based on the Ramachandran plot. There are new perspectives for a better understanding of the venomous function and for fostering the discovery of new venom-derived drug candidates.

Keywords: Venom, toxin, poison, docking, *Daboia russelli*, structure prediction

EVALUATION OF SYNONYMOUS CODON USAGE PATTERNS OF UP-REGULATED GENES IN ORAL CANCER

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One of the most serious diseases in this century is oral cancer, especially in parts of South East Asia. Although there is currently no recognized cure for oral cancer, it spreads quickly. The study of codon use bias (CUB), a natural occurrence, can provide information about the genes' function, molecular biology, and evolutionary factors. This study's CUB analysis helped us learn a lot about the 651 up-regulated oral cancer genes. The genes' base compositions were in the following order: C > G > A > T, and at the third codon position, C₃ > G₃ > T₃ > A₃. On the other hand, the order of the three places' total GC content was GC₃ > GC₁ > GC₂. For 651 genes, the effective number of codons was computed; the average value was >35, indicating a low CUB of the genes. We discovered that the more commonly utilized codons were GC ending

by computing the RSCU values of the codons. 10 codons were underrepresented, while there were 6 overrepresented codons.

Keywords: CUB; RSCU; up-regulated genes; oral cancer

MICROPLASTICS POLLUTION DETECTION IN AQUATIC ENVIRONMENT USING REMOTE SENSING

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Recently, The increase in plastic pollution is emerging micro level pollution and the total weight of microplastics (<0.33mm-1.00 mm) in the ocean column. Plastics in water (in their different forms, macro, meso, micro, and nanoplastics) are contaminants of emerging concerns. The study aim of this review is to analyze advances in technology such as the use of satellite sensors to monitor the occurrence of macro and micro plastics in water. Satellite sensors, including optical, synthetic aperture radar (SAR), hyperspectral, and thermal infrared (TIR) sensors, can either monitor plastics directly or simulate plastic concentrations based on measurements. In view of this hypothesis, surfactants can there for act as microplastic tracers. Sentinel-1A and COSMO Sky Med radar images acquired in the ocean gyres to detect surfactants using SAR, radar remote sensing has the potential to detect plastic pollution. Artificial intelligence (AI)-processed satellites are proving to be a new powerful tool in the fight to protect water systems from pollution. This is an innovative methodology with huge potential to offset the drawbacks of physical sampling and laboratory analyses. The scientists found that microplastics tended to be present in smoother waters, demonstrating that CYGNSS (NASA's Cyclone Global Navigation Satellite System) data can be used as a tool to track ocean microplastic from space. Most researchers have highlighted plastic pollution in water as a 21st century problem of contaminants of emerging concerns (CECs) in the coastal zones, terrestrial, riverine, and oceanic ecosystems. Therefore, it presents a global environmental catastrophe that requires immediate attention.

Keywords|: Microplastics, pollution, Remote sensing

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BIOTECHNOLOGY

ANTIMICROBIAL RESISTANCE: A GLOBAL THREAT AND ITS IMPACTS ON AQUACULTURE

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One of the major public health issues of the twenty-first century is antimicrobial resistance (AMR), which poses a threat to the efficient prevention and treatment of an expanding number of infections caused by bacteria, parasites, viruses, and fungi that are no longer susceptible to the conventional antibiotics used to treat infections and raises the possibility of disease transmission, life-threatening illness, and death. Around 700 thousand people worldwide die each year from drug-resistant infections. The economic cost of AMR from lost global production by 2050 is around \$100 trillion. Global deaths of AMR each year by 2050 are 10 million. Most of the time, antibiotics are used in situations outside of human medicine. Antimicrobial use in food-producing animals and aquaculture for growth promotion and disease treatment or prevention is probably a major contributor to the overall problem of resistance. Aquaculture is essential to providing millions of people with food security in many developing nations. Integrated fish farming methods have a significant role in the spread of AMR globally, in addition to the direct application of antibiotics in aquaculture systems. In aquaculture, several bacterial diseases routinely encountered, which affect successful production, are mainly due to Gram-negative organisms such as *Aeromonas sp.*, *Vibrio sp.*, *Flavobacterium psychrophilum*, *Edwardsiella tarda*, *Citrobacter freundii*, *Pseudomonas fluorescens*, and *Yersinia ruckeri*; rarely by Gram-positive ones such as *Streptococcus* and *Staphylococcus*; and also by acid-fast *Mycobacterium sp.* The consumption of such infected cultured fish poses public health concerns including for humans. Around 73% of the major aquaculture-producing countries were reported to use oxytetracycline, florfenicol, and sulphadiazine, and 55% applied erythromycin, amoxicillin, sulfadimethoxine, and enrofloxacin as reported. In order to control the overuse of antibiotics and the development of antibiotic resistance, effective alternative techniques must be presented in the aquaculture sector.

Keywords: Antimicrobial resistance, Antibiotics, Aquaculture, Bacteria

IDENTIFYING NOVEL REGULATORS THAT DETERMINE THE DOPAMINERGIC NEURONAL FATE SPECIFICATION

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Parkinson's Disease (PD) is a major neurodegenerative disorder, affecting mostly 2-3% of the world population, mainly over the age of 60. The pathological hallmarks of PD include progressive and selective loss of substantia nigra pars compacta (SNPc) dopaminergic (DA) neurons, presence of intraneuronal proteinaceous cytoplasmic inclusions called the Lewy bodies in the SNPc and the loss of nigrostriatal DA termini with its resulting motor symptoms including

resting tremors, rigidity, akinesia and postural instability. The selective degeneration of SNPC neuronal sub population, as compared to that of ventral tegmental area (VTA), along with the difference in the axonal arborization of these two regions are considered to be the major factors causing the pathology. Hence, in our study, we are attempting to understand the role of a zinc finger transcription factor known as Zic3 in DA fate specification, especially in the MidBrain and also to generate better quality dopaminergic neurons using a minimal cocktail of Zic3 and Pitx3 (a MB specific transcription factor). Here, we are also trying to decode the role of Zic3 in neuronal arborization.

ANTI-QUORUM SENSING ACTIVITY FROM MARINE BACTERIA

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Unregulated consumption and overexploitation of antibiotics have paved the way for the emergence of antibiotic-resistant strains and ‘superbugs’, which also pose a severe challenge in combating infectious diseases. Finding new effective antibiotic compounds is costly and time-consuming, and the possibility of developing resistance is high. In the last few decades, researchers have concluded that Quorum sensing (QS) genes firmly control the virulence artillery of the pathogen, and their expression drives the aggressiveness of the infection. The antibiotic resistance (AR) mechanism of any organism strengthens with the biofilm formation ability of microorganisms, which is mainly regulated by quorum sensing (QS). Quorum sensing (QS) is a global gene regulatory mechanism in bacterial pathogens expressing virulence factors by producing and secretion of small signalling molecules. QS is well studied at *Pseudomonas aeruginosa*. Disabling the QS system with an anti-infective agent is a sustainable and potential strategy to tackle bacterial pathogens. QS inhibitors do not kill pathogens but disrupt their communication. Samples were collected from undisturbed areas along Gujarat’s coast of Gujarat like Mandvi, Dwarka and Diu. A total of 72 marine isolates were obtained, out of which 24 were associated with various marine macro-organisms like sponges and algae, whereas 48 were free living. The ability of quorum-sensing inhibition of all the isolates was tested against *Serratia marcescens* by co-culture technique to detect signal-degrading and non-degrading quorum-sensing inhibitors simultaneously. From primary co-culture screening total 44 bacterial isolates including 12 as macro-organism associated bacteria and 28-living bacteria were potentially found to have quorum sensing inhibitory potential against *S. marcescens* without affecting its growth. All five microorganisms were selected based on their ability to degrade N-acetyl-homoserine lactone (HSL) QS signal activity. Cell-free supernatant of selected five isolates was extracted with ethyl acetate to obtain the quorum quenching compound. Pigment inhibition in *S. marcescens* treated with cell free extract was demonstrated by diffusion disk assay and was found to have quorum sensing inhibitory activity without affecting its growth. Based on the above-obtained results, marine isolates were found to be a good candidates for production of anti-quorum sensing molecule which may serve as alternative to conventional inhibitory molecule and can be a good candidates in future for treatment of antimicrobial resistance disease.

GROWING AMAZING PLANTS WITH AQUAPONICS

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Aquaponics is a modern-day agriculture also known as Hydroponics. It is a type of horticulture and a subset of hydroculture which involves growing plants, usually crops or medicinal plants, without soil, by using water based mineral nutrient solutions in aqueous solvent. Does every crop perform well in Aquaponics system? To find answer to this we carried out the experiment on 4 different plants (Iceberg Lettuce, Mint, Basil & Spinach). We made an Aquaponic system with the help of support material and nutrient solution. We were facing few problems in germinating seeds so by performing trials and by providing appropriate conditions we finally got the good result in germination. Currently we have saplings of all these plants, and we are expecting good results in products out of them in upcoming days.

Keywords: Aquaponics, Horticulture, Hydroculture

AQUA CLINIC - A STEP AHEAD IN AQUACULTURE

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The growth and development of aquaculture in India is increasing day by day. Now day occurrence of disease is major constraint in sustainable aquaculture production and product trade there by affecting the socioeconomic status of fish farmers and fishery product exported from our country. Different stress factors such as inadequate chemical, biological and physical stressor can cause infection by opportunistic pathogens. These affect the fish health and may lead to even great loss to farmers. In order to overcome this, a new method for treating the affected fishes can be implemented in the vicinity of fish farms, such as aqua clinics. Aqua Clinic is a health care facility of good aqua laboratory that is primarily focused on the care of aquatic animals which can be operated by Government or Private. Aqua clinics helps to provide expert advice and services that would enhance productivity and ensure increased income to farmers. It could be a stationary or mobile, it typically covers the primary healthcare needs of aquatic animals which is very crucial in aquaculture. Aqua clinics may be well equipped and facilitated to treat fishes, practice induced breeding, to hospitalize and check-up ornamental fishes and to preserve the semen of cultivable indigenous and exotic fishes to mate and produce new young ones. For further convenience the development of mobile clinics can be introduced, so that farmers may receive proper advice and treatment for fishes at their site itself. Vaccines, antibiotics, antibacterial and antifungal medicines can be administered based on its need. Hence, this may help farmers for increasing productivity and treating ornamental fishes over by the common people. Thus, aqua clinic dissemination and mobile aqua clinic throughout the country may have its way for future aquaculture growth and development in India.

Key words: Aqua clinic, Disease, Aquaculture

DNA BARCODING OF MARINE FISHES OF VERAVAL, GUJARAT

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The biological effects of global climate lead to the importance of the identification of organisms to preserve species because of increasing habitat destruction. The extinction of animals and plants is increasing yearly with thousands of them are lost each year and most of them are not identified yet. A new ecological approach called DNA barcoding has been designed to provide accurate, fast and automatable species identification by using short and standardized gene regions as internal species tags to construct a phylogenetic tree. DNA barcoding involves the amplification and sequencing of a short universal molecular tag of approximately 650 bp from the 5' region of the mitochondrial cytochrome oxidase I (COI) gene. DNA barcoding using COI has been widely employed in various biological fields with proven ability to differentiate closely related species in studies ranging from forensic sciences, molecular systematics to seafood products identification. Additional studies have shown that genetic identification by "COI barcodes" can provide a useful tool to identify seafood for consumer protection, to control fisheries, to detect possibly cryptic species, and even to describe new species. Overall research work involves three steps, (1) Site selection and sample collection, (2) Isolation of DNA and sequencing and (3) Analysis of diversity and submission of the sequence. Till date, specimens of about 300 marine fish species have been collected, out of which 150 species of marine fish have been barcoded from the coastline of Gujarat state.

Keywords: DNA Barcoding, DNA Sequencing, COI

EFFECT OF BIOFLOC OF GROWTH PERFORMANCE AND SURVIVAL ON OREOCHROMIS NILOTICUS NILE TILAPIA

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Biofloc technology is considered as sustainable, environment-friendly and cost-effective technology for shrimp aquaculture due to its several beneficial effects such as disease prevention, water quality maintenance, and growth performance. The experiment was conducted 45 days to evaluate growth performance and survival on *Oreochromis niloticus* under biofloc system. The treatment and control were used in triplicate. Molasses was used as a carbon source for biofloc formation with 10:1 C:N ratio. research was conducted in FRP Plastic tank capacity of 150 liter. Advance fry of fish with an average body weight 2.22 gm was stocked 50 fish per tank. At the end experiment biofloc based treatment showed better growth performance compared to control. The survival of fish was found better in biofloc compared to control. The *Oreochromis niloticus* can adopt well in biofloc technology and improved growth, overall production and survival under biofloc system.

Keyword: Biofloc technology, *O. Niloticus* Growth, survival

A RAPID AND NON-INVASIVE TECHNIQUE USING ELECTRO PHOTONIC IMAGES (EPI) ANALYSIS FOR AGRICULTURE MODELING: A STUDY ON HEALTHY AND INFECTED COTTON (GOSSYPIUM HIRSUTUM L.) BOLLS

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Cotton fiber is an important raw material for the textile industries and cotton seeds are rich source of protein rich oil. The main objective of the present study was to analyze the different growth phases of *Gossypium hirsutum* plant at different time intervals using Electro Photonic Images (EPI). EPI is a simple, easy and noninvasive methods help to understand subtle changes in biological object without compromising its integrity. In this experiment, Electro Photon Image (EPI) analysis technique in agriculture applications for detection of healthy and infected status in cotton ovule, is worked out. Different stages of cotton bolls were analyzed for EPI along with different growth parameters, like fresh and dry weights, water content of the locules at weekly growth periods. EPI parameters i.e. total intensity, GDV area and energy showed statistically significant relationship between healthy boll and infected boll. The present research will provide a reference for comprehensive evolution of the economic feasibility and importance of EPI technique for easy, simple and quick detection of infected bolls in early stage of the plant.

Keywords: Cotton boll, Growth phases, Noninvasive method, Electro photon images

NANOTECHNOLOGY: A NEXT-GENERATION TOOL FOR HEALTHY AQUACULTURE

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Aquaculture around the world has converted as an important industry supplier of high nutritional value food, employment, and incomes in different localities around the world. However, the Aquaculture industry needs to attend to different problems to optimize production systems, like diseases, nutrition, and water pollution, which impact not only the cultured organisms but also the environment. In this regard, developed new techniques in science and technology to cope with these challenges in aquaculture. Among these, nanotechnology has emerged with a tremendous potential to improve aquaculture with novel nanotools. The “nano” prefix shows a scale that is a billion parts of something. Because of their lower dimensions and their increased number of superficial atoms, which confers them to specific physical, chemical and biological properties, that can be used in different science and productive fields. Nanotechnology has emerged as an innovative and efficacious tool in fish nutrition, biotechnology, genetics, reproduction, pathology, sustaining environmental quality, etc. The application of nanoparticles such as Nano-863, dietary selenium, zinc, and copper-enriched feed can be easily absorbed

inside the cells and can thus enhance fish growth performance. Emerging nanoparticles are currently applied in aquatic systems to reduce water treatment costs by removing pollutants. Genetically manipulated techniques and nano-biotechnology combined to revolutionize fish genetics research. Newer usages of nano-sensors, DNA nano-vaccines, nano-inspired genes, and drug delivery systems have reformed the fish health, reproduction, and immune system. Nanotechnology is currently being employed in the fish processing industry such as Nanoparticles derived from chitosan zinc oxide, and silica has been widely utilized to develop effective nano- delivery agents for promoting fish health, sterile packaging, exact flavour, increasing the storage life of seafood and quality. The application of nanotechnology to aquaculture is still at an initial stage, it may have the potential to solve issues related to animal health, production, and reproduction, as well as prevention and treatment of diseases.

Keywords: Nanotechnology, Nanoparticles, Aquaculture, Disease, Biotechnology

BIOFILM ORAL VACCINE: A WAY TO HEALTHY AQUACULTURE

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The biofilm oral vaccine is an innovative concept for the healthy aquaculture system, at the present to get healthy fish is the biggest task for aquaculturists due to disease outbreaks. Sustainable production from aquaculture systems is becoming a challenge due to the incidence of diseases. The application of chemicals and antibiotics is not safe as it leads to resistance to pathogens. Growing aquatic animals like fish and shellfish and then harvesting the produce of these organisms use for human consumption. Utilizing a vaccine, which often contains a substance that resembles a disease-causing bacterium, usually improves immunity to a certain disease. However, has a major problem due to destruction in the acidic environment of the stomach before reaching the immune-responsive lymphoid organs. It is necessary to confirm that the antigen is effectively delivered to gut-associated lymphoid tissues (GALTs) when creating a vaccination for oral delivery. The development of a bacterial biofilm-based oral vaccine is an innovative technique. Therefore, the vaccine is an effective and safe strategy, among them oral vaccine is the most preferred. Biofilms with multiple immunogenicities can protect bacteria from destruction by gastric acid, whereas biofilms are produced by growing bacteria in a nutrient-depleted condition providing a substrate for its attachment. The biofilm was thus created, inactivated, and administered orally to several fish species. It showed a better humoral and protective response than a vaccine made of free cells. The review of the study of herbivore carps, omnivore catfish, and carnivore murrel, provided an overview of recent advances and bacterial biofilm-based oral vaccine development for the aquaculture industry. Even though various treatment approaches are being used in aquaculture, immunization is quite effective in stopping many of the diseases that are re-emerging in water-based production systems. Utilizing a vaccination has the benefit of being very affordable and simple to implement.

Keywords: Biofilm, Oral Vaccine, Aquaculture, Disease

**PULMONARY ARTERIAL HYPERTENSION IS INCURABLE BUT
ANIMAL MODEL STUDY SUGGESTS AN EXPERIMENTAL DRUG MAY
BE EFFECTIVE**

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Pulmonary arterial hypertension (PAH) is a rare disease characterised by a progressive obliterative vasculopathy of distal pulmonary arterial circulation that usually leads to right ventricular failure and death. Over the last 25 years, more than a dozen drugs representing five drug classes have been developed and approved for the treatment of this devastating disease. Due to small number of patients afflicted by PAH, most health care providers have little experience with its management. To address this gap in medical knowledge, treatment guidelines have been developed by professional organizations and expert committees. Over the last few years, these guidelines have been updated to address the findings from recent clinical trials and ongoing experience with drugs. This review provides an update on most recently published treatment guidelines for pharmacologic treatment of PAH and incorporates them into a contemporary approach to the treatment of this disease.

Keywords: Pulmonary arterial hypertension, pulmonary arterial diagnosis, guidelines, management

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BOTANY

CHARACTERIZATION OF PECTIN ISOLATED FROM PEELS OF *CITRUS JAMBHIRI* AND *CITRUS SUDACHI*

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In present studies pectin was isolated from peels of two citrus fruits (*Citrus jambhiri* and *Citrus sudachi*). The yield of pectin obtained from *Citrus jambhiri* was 12.91% and *Citrus sudachi* was 54.29%. The quality of pectin was determined by observing parameters such as equivalent weight, methoxyl content, anhydrouronic acid content and degree of esterification in pectin. The equivalent weight of *Citrus jambhiri* was 25 g/mol and *Citrus sudachi* was 16.66 g/mol. The methoxy content of *Citrus jambhiri* was 23.25 % and *Citrus sudachi* was 62 %. The anhydrouronic acid content of *Citrus jambhiri* was 0.56 g/mol and *Citrus sudachi* was 1.46 g/mol. The degree of esterification in *Citrus jambhiri* was 40.83 % and *Citrus sudachi* was 66.46%. This suggests that pectin of *Citrus sudachi* has methoxy content more than 50% which suggests that it can easily disperse in water and form hydrogel. The pectin of *Citrus jambhiri* has methoxy content lower than 50% which suggests that it can form gel only in presence of divalent metal cations. Hence, the properties of both pectins are different from each other and are good sources for use as thickening agents and hydrogel formation.

ANTIFUNGAL ACTIVITY OF ESSENTIAL OILS AGAINST BOTRYTIS CINERIA : A CAUSAL AGENT FOR LEAF SPOT DISEASE OF ARACHIS HYPOGAEA L.

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Arachis hypogaea L. is an important legume for food and oilseed crop worldwide. Diseases are major constraints to groundnut production throughout the world. All parts of the groundnut plant are susceptible to diseases. Fungi are destructive agents causing losses of agricultural commodities in many zones of the world, for crop loss or yield reduction. It is important to identification and detection of pathogens to cure diseases. In the present study, fungus isolated from infected groundnut leaves. It was sub-cultured for isolation, identified by morphological and molecular technique. For molecular identification, genomic DNA was isolated and amplified by universal primer and identified by 28s rDNA gene sequencing. It was confirmed as *Botrytis cineria*. Further, in vitro antifungal properties of 10 essential oils (EOs) were evaluated against *B. cinerea*. The chemical composition of most active EO was investigated by gas chromatography - mass spectral analysis. The potential properties of these EOs as ecofriendly and economical biocontrol in agriculture is discussed.

ASSESSMENT ON CHANGING STATUS OF URBANIZATION AND VEGETATION COVER IN JAMNAGAR CITY OF GUJARAT

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The present research was carried out at Jamnagar City of Saurashtra region situated at Gujarat, to evaluate vegetation dynamics, agriculture land cover and changes in urban land use during past three decades. The research was done utilising USGS earth explorer and

QGIS. Decadal Data of year from 1991 to 2021 was collected from Landsat Satellite using USGS earth explorer which was further classified into various classes such as wild vegetation cover, agriculture cover, built up areas, water bodies and Open land in QGIS. Accuracy of the data was evaluated by Kappa Coefficient in Arc GIS and by various statistical analysis. In present studies, wild vegetation cover was maximum in year 2011 and lowest in year 2021, Agriculture cover was highest in 2011 and lowest in 2021, build-up areas were highest in year 2021 and lowest in 1991, water bodies were highest in 2021 and lowest in 1991, open land was highest in 1991 and lowest in 2021. There was positive correlation between humidity and precipitation as well as Built-up and Precipitation. However, there was negative correlation between Built-up and Open Land, Humidity and wind speed as well as Wind Speed and Precipitation. There significant variation between all the parameters evaluated at p-value<0.05 level. It was concluded that there is remarkable gradual increase in build-up areas and agriculture land where as decrease in open land due to urbanization. However, there is no major variation in wild vegetation, water bodies and climate parameters in Jamnagar city of Saurashtra in past three decades.

“EFFECT OF DIFFERENT COMPONENTS ON THE GROWTH OF *PETUNIA HYBRID*”

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Impact of combined Abiotic and Biotic stresses on the growth of plants and avenues for Crop improvement by exploiting physio morphological traits. They always affect the development of plant in the different forms. Some plants have ability to encounter stresses by changing their morphological, physiological and biochemical activities. On the contrary, some plant disturb with these stresses and have negative impact due to reduction in photosynthetic activity, reduced transportation of water etc. Here, certain biotic and abiotic factors are applied to *Petunia hybrida* plant and then influence and reactions are studied for selected time period. Common garden *Petunia- Petunia hybrida* is derived from *P.integrifolia* and *P.axillaris*. Here, the applied factors are ‘wood ash extract’, ‘high temperature and light’, ‘temperate and cold water’ as abiotic factors and ‘neem leaf extract’ and ‘competition between plants’ as biotic factors.

STUDIES ON NUTRITIONAL PROPERTIES OF TELOSMA PALLIDA FLOWER BUDS

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Telosma pallida (Roxb), commonly known as ‘Radarudi’ is a widely grown plant in Junagadh, Gujarat, India. It is widely known for its nutritional and medicinal value. Flowers and leaves are the edible part of the plant while leaf, root, stem and flower have considerable medicinal properties. Flowers are reported to have various nutrients like minerals, vitamin, protein, fibers, and are source of secondary metabolites and phenolic compounds. In the present study flower buds were subjected to secondary metabolite isolation using solvent extraction method. Further, methanolic extract of flower buds was injected to High resolution LC-MS/MS and various primary and secondary metabolites were identified. It was concluded

from the studies that flower buds of *Tellosma pallida* are rich sources of fatty acids, carboxylic acids, amino acids, phytohormones, coumarin, sugars and anthocyanins.

APPLICATION OF X-RAY COMPUTED TOMOGRAPHY (CT) SCANNING FOR GROUNDNUT (*ARACHIS HYPOGAEA* L.) SEED DEVELOPMENT AND AGRICULTURE MODELING

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Groundnut (*Arachis hypogaea* L.) is an important oil seed crop with a high percentage of proteins. In this study, (*Arachis hypogaea* L.) (G-20) seeds were studied for growth analysis during the entire period of seed growth and development and for CT scanning of the pods (fruits). X-ray computed tomography (CT) scanning technique is easy, simple, noninvasive and rapid technique. The main objective of the present study was to study the groundnut seed development at different developmental stage by using X-ray computed tomography (CT) scanning technique. Using the software of this technique, Hounsfield Unit (HU) value and cross section area of the seeds were calculated during different growth phases. In this research during the early stage of pod development Hounsfield Unit (HU) value remained low, increased in dry matter accumulation phase and finally reached a maximum at the maturation stage. HU value and seed dry weight showed a linear relationship. Similarly, cross section area and seed dry matter accumulation showed close relationship. The present research provides reference for the importance of the CT technique for developing digital agriculture model that may help farmers and breeders by providing information about growth and development of plants as well as to increasing crop yield by deciding proper harvest time, irrigation and fertilizer applications.

Keywords: *Arachis hypogaea* L., CT scanning, Dry matter accumulation (DMA), growth analysis, seed development.

ASSESSING THE STABILITY AND CONTROLLED RELEASE OF ERYTHROPOIETIN FROM HYDROGEL BEADS FOR ITS ORAL DELIVERY

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Erythropoietin is a glycoprotein hormone which is given to the patients suffering from severe anemia or chronic kidney disorders. It is naturally produced by the peritubular cells of the kidney to stimulate red blood cell production in human body. It is administered via subcutaneous injection currently to patients suffering from severe anemia or chronic kidney disorders. This is the main treatment method for the management of new red blood cell production in human body. The frequent regular erythropoietin injections are often inconvenient, causes pain, local infection, skin necrosis and nerve damage to patients. So, a controlled drug release hydrogel beads loaded with erythropoietin were prepared from endosperm of *Caesalpinia pulcherima* seeds for oral delivery of erythropoietin to reduce pain of patients. The in vitro controlled drug release analysis suggested that the hydrogel can

release the drug in controlled manner and can survive in acidic pH of the stomach fluids for five days hence it is concluded that patient can take erythropoietin orally once in five days.

ANTIBACTERIAL POTENTIAL OF *CAESALPINIA CRISTA* SEED STORAGE PROTEINS AGAINST HUMAN PATHOGENIC BACTERIAL

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Caesalpinia crista seeds are well known for its medicinal use in treatment of asthma, chronic fever, cough, headache, stomach or bowel upset. Seed Storage proteins of *Caesalpinia crista* seeds exhibit characteristics as antimicrobial proteins or peptides, working on plant defense. These proteins are also associated for defense against other pathogenic strains of bacteria. Therefore, in present studies, proteins were isolated from the seeds of *Caesalpinia crista* and its potential to inhibit the growth of pathogenic bacteria was observed. Protein was isolated from the seeds of *Caesalpinia crista* using 40% ammonium sulfate precipitation and purified using anion exchange chromatography. From the native gel electrophoresis, it was observed that there were totally six protein bands. Maximum proteolytic activity was observed from the first and fourth protein band. Further antimicrobial activity and MIC (Minimum Inhibition Concentration) was performed from each eluted protein against pathogenic bacteria such as *Microbacterium paraoxydans* strain LA5, *Providencia vermicola*, *Lysinibacillus fusiformis*, *Bacillus subtilis* strain CIFT MFB 4158A. All protein bands had growth inhibitory activity against three bacterial species (*Microbacterium paraoxydans* strain LA5, *Lysinibacillus fusiformis*, *Bacillus subtilis* strain CIFT MFB 4158A) except *Providencia vermicola*, which was not inhibited by 5th protein band. Among them, the minimum inhibitory concentration (MIC) required to inhibit *Microbacterium paraoxydans* strain LA5 was 1.72 µg of 4th protein band. The minimum inhibitory concentration required to inhibit *Lysinibacillus fusiformis* was 1.44 µg of 1st protein band. The minimum inhibitory concentration required to inhibit *Bacillus subtilis* strain CIFT MFB 4158A was 0.57 µg of 4th protein band. The minimum inhibitory concentration required to inhibit *Providencia vermicola* was 4.02 µg of 4th protein band. This suggests that among the six band proteins, first and fourth band proteases are more effective in inhibiting the growth of human pathogenic bacteria at MIC level.

DEVELOPMENT OF SHOOT MULTIPLICATION PROTOCOL FOR *MIMOSA PUDICA* L. AN IMPORTANT MEDICINAL PLANT

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Mimosa pudica (Also known as Lajwanti, Lajamani, sensitive plant, touch-me-not) is a creeping perennial flowering medicinal plant belongs to family Mimosaceae. The root of *M. pudica* used for the treatment of leprosy, dysentery, asthma, leucoderma, blood diseases, cancer, bleeding, bronchitis, skin diseases. The stem and leaves are used for treating scorpion stings, toe infections, depression, haemorrhoids and wounds. Because of its immense medicinal properties and lack of appropriate micropropagation protocol, the present investigation has been aimed to develop a mass multiplication procedure for the plant. The present work represents the direct organogenesis from the cotyledons of germinated seeds of the plant. *In-vitro* germination of the seeds of the *M. pudica* were carried out on MS media under aseptic condition. The cotyledons as well as shoot tips of the germinated seeds

were cultured on MS media supplemented with different hormones concentration of Auxin (2,4-D, Picloram) and Cytokinin (BAP, Kinetin). After three weeks of inoculation, callus induction found in the cotyledonary leaf explant. The multiple shoots started raised from the shoot tips after two weeks of culture. Proliferation of multiple shootings (up to 10 number/explant) observed from the shoot apical meristem after 15 days of inoculation and became ready for rooting experiment after 30 days of inoculation. From the tested different media combinations, MP2 media *i.e.*, MS + Kn (2.0 mg/ lit) + BAP (1.0 mg/ lit) was found the best media for obtaining highest number of multiple shootings. In conclusion, direct shoot multiplication protocol has been optimized for *Mimosa pudica* which may be utilized for mass multiplications of the species towards numerous research aspects.

EVALUATING THE IMPACT OF CLIMATE CHANGE ON VEGETATION COVER IN SOUTHERN REGION OF INDIA

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Many studies in recent years have investigated the effects of climate change on the future of vegetation. Weather variables are regarded as one of most significant factors affecting decision making in agriculture. Predicting the response of vegetation to climate change has become an extremely active field of research. The present research was carried out at Southern India which includes states like of Telangana, Karnataka, Andhra Pradesh, Kerala, Tamil Nādu, Goa, Lakshadweep, Puducherry, Andaman&nicobar states. To evaluate the variation in the vegetation cover of this region based on the climate changes, data of past 3 decades were collected from NASA POWER. This weather parameters included humidity, hot temperature, cold temperature, precipitation and wind speed. The data of NDVI was collected through AID DATA and its validation was done by various statistical tools. There was remarkable significant difference in the humidity, precipitation, wind speed and hot & cold temperature in all states during past three decades. Multivariate analysis group the data of NDVI and climate change into two groups : Group A includes year 1991, 2001 and 2011 with low humidity, low wind speed, low precipitation, high hot temperature, low cold temperature and high vegetation cover as compared to year 2021. However, Group B includes year 2021 with high humidity, high wind speed, high precipitation, low hot temperature, high cold temperature and low vegetation cover as compared to year 2001 and 2011. Hence, it was concluded that there is notable significant variation in climate parameters and vegetation cover at p -value < 0.01 which has influenced the growth of plant species in this region and resulted in gradual decrease in vegetation cover during the year 2021.

ESTIMATION OF ABOVE GROUND BIOMASS : A REVIEW OF AVAILABLE LITERATURE AND THEIR ACCURACY IN THE PERI URBAN AREA

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Forest Ecosystem is the largest carbon sink after marine ecosystem and act for mitigation measures of the abrupt effect of recent climate change. Peri-urban forests play a critical role in carbon sequestration and regulating local climate under the constant threat of urbanization. Urban forests although poorly studied can have a considerable volume of above ground

biomass and can potentially sequester a large volume of carbon, often ignored compared to big forest areas under different protection regime. The Intergovernmental Panel on Climate Change (IPCC) identified five carbon pools of the terrestrial ecosystem involving biomass, namely the above ground biomass, below ground biomass, litter, woody debris and soil organic matter. Among all the carbon pools, the above ground biomass constitutes the major portion of the carbon pool. A variety of approaches and data sources have been used to estimate Above Ground Biomass, mostly restricted to using the measurement of bulk volume and allometric equation, combustion method for organic carbon, and remotely sensed data and GIS based modeling. The present study reviews the various methods used for the estimation of above ground biomass and their efficacy in small forest patches or peri urban forest patches. While the combustion based method gives accuracy in the estimation, use of species specific allometric equation along with the structural measurement of the trees gives the robust estimate of above ground biomass in peri urban low density forest patches, compared to GIS based modelling. The study also gives a data-base on existing information available for above ground biomass estimation using allometric equation for the Dry Deciduous and thorn forest within the Arid landscape. Keywords: above ground biomass, forest ecosystem, peri-urban area, carbon sequestration, allometric equation

EVALUATING STABILITY AND CONTROLLED IN VITRO RELEASE OF SURFACTINS USING GALACTOMANNAN BASED HYDROGEL

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Surfactins isolated from *Bacillus subtilis* shows various physiochemical and biological activities such as antiviral, antibacterial, anticancer and antimycoplasma activities. Since, these peptides have potential to inhibit the proliferation of cancer cells in human body they can be utilized for treatment of various cancer diseases. However, the stability and delivery of this peptide in human body fluids is a major challenge. Hence, In present studies, a controlled drug release hydrogel disc loaded with surfactins were prepared from endosperm of *Cyamopsis tetragonoloba* L. seeds for oral delivery of surfactins to cancer patients. The in vitro controlled drug release analysis suggested that the hydrogel can release the drug in controlled manner and can survive in acidic pH of the stomach fluids for four days hence it is concluded that patient can take surfactins orally once in four days.

Improved protocol of RNA isolation for transcriptome analysis of Zea mays

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The existence of metabolites that interfere with isolation procedures and downstream applications makes plant RNA extraction difficult. The current research used a standardized RNA extraction protocol from maize (*Zea mays* L.). We developed a protocol for extracting pure RNA from plant tissues using the TRIzol reagent, and show that this RNA extraction method works not only at Low temperatures but also at room temperatures, making it the easiest and most efficient method for extracting pure and undegraded RNA directly from

tropical plants in the field. RNA isolation methods based on our modified protocol yielded good results in maize leaf, seed, flowers and other grass species. The isolated RNA was found to be suitable for both PCR and RT-PCR amplification and transcriptome analysis. The method is repeatable and can be used to isolate high-quality RNA and conduct gene expression studies. RNA extraction paves the way for deciphering the complex regulatory network involved in multiple stress responses by studying gene-environment interactions at the transcriptome level.

Keywords: RNA extraction, transcriptome, TRIzol reagent, downstream applications

METAL CHELATING AND ANTIOXIDANT POTENTIAL OF PHASEOLIN PROTEINS ISOLATED FROM TWO VARIETIES OF *PHASEOLUS LUNATUS* L.

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Phaseolin proteins from *Phaseolus lunatus* are seed storage proteins which are helpful as antioxidants and resistant to digestive proteases which are helpful to patients suffering from alimentary canal diseases. Besides, they are helpful in the identification of genetic variants of major seed proteins. In the present studies, phaseolin was isolated from *Phaseolus lunatus* (small and large varieties) & *Phaseolus vulgaris*. Isolation of phaseolin was 40% and 50% ammonium sulphate, purified by the DEAE Sephadex A-50 matrix followed by affinity gel permeation chromatography, molecular weight of proteins was determined by the gel electrophoresis and the protein bands were eluted. The antioxidant activity, α -amylase inhibition activity and metal chelation activity were done using the eluted bands. A total of 29 major bands were observed, out of these 11 bands showed antioxidant activity, α -amylase inhibition activity and metal (Fe and Cu) chelation activity. Hence, it is concluded from the present studies that the phaseolin isolated from *Phaseolus lunatus* (small and large varieties) & *Phaseolus vulgaris* have antioxidant, digestive enzyme inhibition and metal chelation activity.

DIVERSITY AND DISTRIBUTION OF MARINE ALGAE AT VERAVAL COASTAL AREA, GUJARAT

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The present investigation on diversity of seaweeds of Veraval coast Saurashtra region of Gujarat was carried out. During the investigations seaweed from intertidal zones were collected fortnightly from September - November 2022. The collected species were identified taxonomically and classified. A checklist of the species available was prepared. During the study a total of 14 species were recorded including 07 species of Chlorophyceae, 04 species of Phaeophyceae and 03 species of Rhodophyceae. The voucher specimens were preserved as herbariums. Rhodophyceae showed more preponderance in the seaweed flora at Veraval coast. It is also found that in general, Chlorophyceae and Phaeophyceae observed during the initial months of survey *i.e.* September to January.

Keywords: Seaweed diversity, Chlorophyceae, Phaeophyceae, Rhodophyceae, Checklist, Veraval coast.

IN VITRO MICROPROPAGATION OF SANTALUM ALBUM OR INDIAN SANDALWOOD

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In Ayurveda, basically *S. album* is used for its general adaptogenic, rejuvenating, immunomodulatory activity. The high value of the species has caused its past exploitation, to the point where the wild population is vulnerable to extinction. Indian sandalwood still commands high prices for its essential oil, but due to lack of sizable trees it is no longer used for fine woodworking as before. A protocol was established for rapid clonal propagation medicinal plant, *S. album*, through *in vitro* culture using nodal explants. Nodal explants of *S. album* were incubated on MS medium with different concentration of KINETINE (0.2 mg/lit, 0.4 mg/lit, 0.6 mg/lit, 0.8 mg/lit, 1 mg/lit) and NAA (1 mg/lit). NAA was constant in the entire medium used. Among the different media tested, MS basal medium with NAA was found to be the best for shoots sprouting and multiplication.

STUDY OF DIFFERENT PLANTS THAT ARE USED AS RELIGIOUS RITUALS

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Plants play a very important role to human beings in different ways. My present study deals with the study of different plant species used in Religious Rituals. There are many plants used as Religious Rituals that differ from different localities and different religions. This study particularly reveals different plant species used as Religious Rituals specially taking into consideration of Saurashtra region of Gujarat State.

HELPFUL AND HARMFUL EFFECTS OF SOME SELECTED MEDICINAL PLANTS

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Most of the plants have medicinal quality to cure different diseases with very less side effect or no side effect. Our present study mainly deals with the study of toxicity of the particular medicinal plants that are used for curing one or the other diseases. Our study mainly tries to cover 19 different medicinal plants that show the presence of toxicity and some allergic quality in that particular medicinal plants. This study concludes that medicinal plants are helpful but at the same time if not used properly they are harmful.

ROLE OF PLANT GROWTH PROMOTING ENDOPHYTE BACTERIA FOR SUSTAINABLE AGRICULTURE

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Endophytic bacteria are plant-associated bacteria that live in the internal tissues of the plant without harming the host plant. They have an important role in plant growth promotion, as they directly or indirectly promote plant growth. They do it by inhibiting the growth of plant pathogens, by producing various secondary metabolites. They are used in the agricultural sector as an eco-friendly alternative tool that helps to improve crop yield. Detection of plant defense response and identification of compounds synthesized by root endophytes are an effective means for their utilization in the agriculture sector as biofertilizers. Therefore, it is important to study the diversity of root endophytic microbial community, endophyte-host plant interactions and their colonization, and their activity for successful application in agricultural lands

Keywords: Antimicrobial agents, Bioactive compounds, Endophytic bacteria, Modulation, Phytohormones, Secondary metabolites.

ROLE OF SOME SELECTED MEDICINAL PLANTS ON HUMAN WELFARE

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Plants play a very important role in Human welfare in one or the other ways. They have a very good value of medicinal property also providing many drugs from earliest times to the present. My current study tries to give an elaborated data on some selected 25 different Medicinal plants that are playing a key role in one or the other way in Human Welfare. Plants not only used as medicine but are also used to benefit different Humans need like food, gum, resins, agricultural equipment's etc. Almost all plants play a key role in Human welfare but my studies try to elaborate 25 plants species.

A COMPARATIVE STUDY ON INCREASING POST HARVEST SELF LIFE OF CERTAIN FRUITS AND VEGETABLES USING PLANTS AND PLANT PRODUCTS

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Perishable living products that require coordinated activity by growers, storage operators, processors, and retailers to maintain quality and reduce food loss and waste. The extent of coordination can vary greatly from loose in the case of local food supplies to complex for global supply chains. For smooth coordination and fresh use of vegetables and fruits, shelf life of fruits and vegetables can be increased using some plants like Aloe vera, Lemon, Turmeric and also by using some plant products like Castor oil or rich source of Ascorbic acid.

ROLE OF MUSHROOMS IN NATURE AND ON HUMAN WELFARE

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Mushrooms are a group of Basidiomycetes fungi called as (Higher fungi) found distributed soil, dead and decomposed part of Soil, Dead parts of Woods etc. The best suitable time for growth and development of these particular fungi is Monsoon, as it requires wet condition for its life cycle. My present study tries to give some 25 different Mushrooms species and its importance in Nature and on Human Welfare. Mushrooms have a good quality of decomposition which leads to the cycling of different mineral nutrients in to the Nature. Moreover Mushrooms are edible and are highly nutritive without any side effects. The edible qualities of some Mushrooms have played a very important role on Human welfare.

MEDICINAL USES OF KITCHEN SPICES AND HERBS

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There are many Plant species in the form of Herbs & many Plant species in the form of spices, which are used in cooking in day today's life. Our minor research work deals with the study of Medicinal quality of this particular Herbs and Spices that are used as food. Our present study mainly tries to cover 10 Herbs and 10 Spices used as food in day today's life having Medicinal properties in one or the other ways.

A PRELIMINARY OBSERVATION ON TOTAL DISSOLVED SOLIDS (TDS) LEVEL OF AREAS IN AND AROUND BHUJ CITY, KACHCHH (WESTERN INDIA) AND IMPLICATION OF CHITOSAN AS ONE OF THE REMEDIAL SOLUTIONS

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Kachchh located at the western end of India, is an arid and water-scarce zone. In the present study we tried to understand the TDS (Total dissolved Solid) levels of ground water from different available localities around Bhuj city. As this is a preliminary survey, the location and talukas around Bhuj were surveyed from TDS levels. Apart from TDS from ground water, samples from RO water were also used, which served as control. High TDS levels were observed in most samples. The results are discussed in the study. Also, the use of chitosan as an adsorbent material is discussed herewith as a solution which demands further study.

Key words: ground water, Total dissolved solids, kachchh

DOMESTICATED PLANTS LOSE THE ABILITY TO FORM SYMBIOTIC RELATIONSHIPS WITH FUNGI AND BACTERIA

Detroja Aaradhna, Aghara Swati, Makasana Janvi

Domesticated plants lose the ability to form symbiotic relationships with fungi and bacteria. While domestication of plants has yielded bigger crops, the process has often had a negative effect on plant microbiomes, making domesticated plants more dependent on fertilizer and other soil amendments than their wild relatives. As people domesticated plants, they have made their fruit and seeds bigger. The plants were also protected by people from insects and other pests to some degree.

Keywords: Domesticated plants, Bigger crops, Mutualism, Plant microbe interaction, Domestication

IS PLANT HAS BRAIN?

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Plants may lack brain, but they have a nervous system of senses. As per research the plants can not feel the pain but they react by some chemical senses. These senses are of many different types. When the leaf of a plant gets eaten, it warns the other leaves by using some of the same signals as animals. The cell of a leaf shares the signal of defence to another cell to cell by some molecules. The new work is starting to unravel a long standing mystery about how different parts of a plant communicate with one another. Plants can communicate with each other by the senses through roots or air. This all is known as Plant Intelligence. Plants can detect their neighbours by signals. The plant intelligence is including Signalling, Memory, Communication, Mathematics, Neighbouring and many others.

COMPARATIVE ANALYSIS OF TWO LATEX PLANTS FROM EUPHORBIACEAE FAMILY

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Plant latex is an endogenous fluid secreted from laticifer cells which act in plant defense system. The latex is also a rich source of pesticides, pharmaceuticals and immune allergens because of the presence of flavonoids, acetogenins, phytosterols, alkaloids and phenols. In the present studies, the chemical profile of latex of *Euphorbia lactea* and *Jatropha curcas* was investigated. The latex of the plant was collected from the *Euphorbia lactea* and *Jatropha curcas* and isolation was done using an extraction buffer that contains 0.1% Sodium sulphate and 0.2% ammonia, followed by the flow method. Various metabolites were extracted by solvent extraction method using polar and non-polar solvents such as hexane, acetone, diethyl ether, chloroform and methanol. Further, characterization of metabolites present in the methanolic extract was done by using high resolution LC-MS/MS analysis. The result indicated that there was a remarkable difference in the metabolites content of latex isolated from *Euphorbia lactea* and *Jatropha curcas*. In latex of *Jatropha curcas* majority of amino acids and carboxylic acids were identified. However, in latex of *Euphorbia lactea* fatty acids, terpenoids and diterpenoids were identified. This suggests that although both plants' latex differ from each other in metabolites composition, it has a role in plant wound healing and defense mechanism.

FLOWER POWER

Kalola bhavya and Jignasa Joshi

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This blooms holds a great medicinal and economical value. There is a method to cure various disease and prevent a physical and mental health of an individual by means of treating our emotional unbalance. Whereas nectar and pollen provision to predators and parasitoids is often a main objective in pursuing agricultural biodiversity, we generally know little about whether the flowering plant species involved are actually suitable as food sources, economic or medicinal importance or what their ultimate impact is on biological pest control. Here we highlight the potential as well as the pitfalls of using floral biodiversity in conservation and biological significance. Many floral tools are also used for flower power.

MEDICINAL PLANTS –A FIRST LINE OF DEFENCE AGAINST POST-COVID-19 CARE

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Medicinal plants have been used since the prehistoric period by Indian traditional medicinal systems like Ayurveda, Siddha, Unani & Yoga, Naturopathy and Homoeopathy. Medicinal plants are important resources as a first-line defence in the current crisis of post covid as they are a rich source of natural phytochemicals such as alkaloids, terpenes, glucosinolates, phenolics, and flavonoids. Although, they are not disease-specific but act as a preventive medicine that positively enhances overall health and well-being by boosting the immune system and also rejuvenating the whole system of the body without any side effects. The World Health Organization (WHO) welcomes innovative innovations around the world regarding traditional medicines and developing new therapies in the search for potential treatments for care post-COVID-19 disorders. Ministry of AYUSH, Govt of India, offer services as per the approved protocol for prevention, care of mild to moderate cases, and most importantly, for post-COVID care and rehabilitation for which the biomedical system has limitations. They facilitate *Rasayana* drugs made up of medicinal plants such as Ashvagandha (*Withaniasomnifera*), Giloy (*Tinosporacordifolia*) and Amla (*Emblicaofficinalis*) help in B and T cell proliferation, NK cell activation, selective Th1 upregulation, increased CD4+, CD8+ count, and decreased IL1b and IL6 - all this can play a crucial role in strengthening the immunity and prevent infections. The All-India Institute of Ayurveda has successfully treated hundreds of mild and moderate COVID patients as well as effectively managed post-COVID recovery. We all know that “prevention is better than cure”. While there is no medicine for COVID-19 as of now, it will be good to take preventive measures which boost our immunity in these times to combat COVID and other related diseases as well.

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MICROBIOLOGY

A SURVEY ON PREVALENCE OF SKIN INFECTION CAUSED BY FUNGUS IN SAURASHTRA REGION

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Skin diseases are frequent and quite perennial in the world, in most cases fungal species is the reason. Data was collected of last one month from various hospitals in saurashtra region. To determine the prevalence and treatment management of skin fungal infections. Skin fungal infections were divided into two groups: namely dermatophytosis and other superficial mycoses. The fungal species that caused skin infections are *Tineanigra*, *Tineaversicolor*, *candida albicans* etc. The treatment includes various antifungal medicines. The analysis of patients suffering from skin infection caused by various fungi was done.

Keywords: Treatment management, prevalence, superficial mycoses.

OPTIMIZATION OF VARIOUS PHYSICAL AND NUTRITIONAL PARAMETERS FOR MAXIMUM LIPASE PRODUCTION

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Lipase is an enzyme that catalyzes the hydrolysis of triglycerides into fatty acids and glycerol and it also has the capacity to carry out lipid degradation as well as lipid synthesis. Lipase is obtained from animals, plants, and as well as from several microorganisms. They found enormous applications in the industries of fat and oil processing, oleochemical industry, food industry, detergents, environment management, tea processing, biosensors, and cosmetics and perfumery. Potential lipase-producing bacteria were isolated from the oil-contaminated soil of the edible oil industry. This study carried out optimization of various physical (incubation time, pH, temperature, inoculum size) and nutritional parameters (Carbon and nitrogen Sources) for maximum lipase production from selected bacterial isolates SHR-04 and SHR-07. Optimization was carried out by OVAT (One Variable at a Time) method. Both the isolate has given maximum lipase production at 48h, 30°C, and pH-7, and inoculum size was 2%, as for carbon and nitrogen source maximum production was found in groundnut oil and peptone respectively.

EVALUATION OF PROBIOTIC ATTRIBUTES OF PUTATIVE PROBIOTIC BACTERIA

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Probiotics are dietary supplements containing viable, non-pathogenic microorganisms interacting with the gastrointestinal microflora. Gut microbiota plays a crucial and constructive role in maintaining and improving the host's health through various metabolic activities. This study aims to evaluate the functional attributes and safety aspects of selected isolates of human origin source

grown on MRS (De Man, Rogosa, and Sharpe) medium. The properties of three probiotic strains (SFN, GFN & FFN) were evaluated and compared with strain *L. rhamnosus*GG. The functional attributes include the study of bile salt hydrolase activity and antimicrobial activity, while safety aspects include studying DNase activity and evaluating antibiotic susceptibility profile. Overall our findings signify that the strains mentioned above have the potential to safe probiotics.

Keywords: Probiotics, Gut microbiota, Antimicrobial Activity, Safety Aspects,

STEM CELLS: THE BIOLOGICAL PROGRAMMER

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Stem cells are one of the human body's master cells with ability to grow into any one of the body's more than 200 cell types. They are unspecialized and undifferentiated cells capable of self-proliferation, migration and differentiation. Stem cells are immature precursor cells with a capacity to specialize and differentiate into a mature specialized cell. Stem cells undergo asymmetric division, forming not one but two daughter cells: one cell often an exact replica of itself, a new stem cell with a relatively clean slate, and another stem cell that is ready to turn into a specific type of cell. This trait is known as self-renewal. Types of stem cells: Embryonic Stem Cells (ESCs), Adult Stem Cells, Umbilical Cord Blood Stem Cells and Placental Stem Cells. Stem cells can be extracted from many sources including umbilical cord, blood and bone marrow. According to current research stem cell can treat around 80 diseases. Diseases like heart disease, diabetes, autism, Alzheimer's disease, etc. can be treated using stem cells. In recent years stem cell therapy has become a very promising and advanced scientific research topic. The development treatment methods have evoked great expectations.

Keywords: Stem Cells, Embryonic stem cells, Adult stem cells, Cord blood.

PROBIOTICS AS AN ALTERNATIVE ANTIMICROBIAL THERAPY: CURRENT REALITY AND FUTURE DIRECTIONS

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Microorganisms that live in symbiosis with the human host are referred to as "probiotics." Probiotics may regulate biological processes in ways that are beneficial to health when consumed in sufficient amounts. Probiotics have been reported to exhibit a variety of biological features, including antimicrobial action. However, there isn't much research looking into the use of probiotics as potential sources for novel antibiotics or as alternatives to conventional antimicrobial therapy. As a result, we offer a broad overview of the probiotic antimicrobial research landscape in this review and identify key areas for future research. Probiotics have been shown to have positive effects on intestinal health, but there is still no agreement or standardisation on the development of delivery methods or the use of probiotic formulations for

antimicrobial therapy. Consequently, additional bioguided research and clinical trials are required to address the existing gaps in knowledge.

Keywords: Probiotics, antimicrobial action

SCREENING AND CHARACTERIZATION OF IAA PRODUCER FROM RHIZOSPHERIC SOIL

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Numerous physiologically active rhizosphere bacteria produce plant growth promoting substances that aid in plant development and control plant diseases. Plant growth-promoting rhizobacteria (PGPR) improve plant growth by production of IAA, ammonia, siderophore, HCN, phosphate solubilization, and nitrogen fixation. Additionally, the usage of PGPRs can improve plants' ability to thrive and resist harmful environmental conditions like drought, salt, and nutrient shortage. Many significant physiological effects, including the stimulation and facilitation of plant growth, are thought to result from indole acetic acid (IAA) producing bacteria. The present work deals with the isolation and characterization of indole acetic acid producing bacteria from rhizospheric soil and the examination of their effect on crop plants. Based on the study, it is concluded that IAA-producing bacteria can be used as effective biofertilizer inoculants to stimulate plant development.

Keywords: Plant growth promoting rhizobacteria, Indole acetic acid (IAA), Biofertilizer

SCREENING AND CHARACTERIZATION OF IAA PRODUCER FROM RHIZOSPHERIC SOIL

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Numerous physiologically active rhizosphere bacteria produce plant growth promoting substances that aid in plant development and control plant diseases. Plant growth-promoting rhizobacteria (PGPR) improve plant growth by production of IAA, ammonia, siderophore, HCN, phosphate solubilization, and nitrogen fixation. Additionally, the usage of PGPRs can improve plants' ability to thrive and resist harmful environmental conditions like drought, salt, and nutrient shortage. Many significant physiological effects, including the stimulation and facilitation of plant growth, are thought to result from indole acetic acid (IAA) producing bacteria. The present work deals with the isolation and characterization of indole acetic acid producing bacteria from rhizospheric soil and the examination of their effect on crop plants. Based on the study, it is concluded that IAA-producing bacteria can be used as effective biofertilizer inoculants to stimulate plant development.

Keywords: Plant growth promoting rhizobacteria, Indole acetic acid (IAA), Biofertilizer.

GUT MICROBIOME COMMUNICATION

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This review is based on the evidence about the relationship between the human gut microbiome and organ functioning outside the gut. Specific axes between the gut and non-gastrointestinal organ systems have been identified. There are trillions of microbes that inhabit the intestine which are known as the human gut microbiota. The interaction between microbiota and gut-brain axis appears to be bidirectional, mainly through signalling from gut-microbiota to brain and from brain to gut-microbiota by neural, endocrine, immune means. Recent advances in research have described the importance of gut microbiota in influencing these interactions. Evidence of microbiota-GBA interactions comes from the association of dysbiosis with central nervous disorders (i.e. anxiety- depressive behaviours) and functional gastrointestinal disorders, damage of the gut microbiota-host symbiosis leads to diseases such as obesity and irritable bowel syndrome.

Keywords: Gut microbiota, Gut-brain axis, central nervous system, irritable bowel syndrome

EFFECTS OF PROBIOTICS ON THE GUT MICROBIOTA

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Recent discoveries of human gut microbiota reflect that a decrease in microbial diversity may lead to an increase in liability to develop different disease phenotypes. Intestinal microbes convert dietary nutrients into biologically active metabolites which may affect the regulatory function in the host. Probiotics may help in restoring the composition of the gut microbiome and help in preventing different disease phenotypes. This review describes what is gut microbiome, its benefits, and the role of probiotics on gut microbiota.

Keywords: Probiotics, Microbiome, Microbiota

MICROPLASTIC

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Scientific studies of microplastics have expanded since 2015, propelling the topic to the forefront of scientific inquiry. Microplastics are ubiquitous in the environment and pose a potential risk to human health. The purpose of this review is to organize microplastics literature into areas of scientific research, summarize the state of the literature and identify the current data gaps in knowledge to promote a better understanding of human exposure to microplastics and their potential health effects. the role of media in framing perceptions and socio-cultural dimensions to popular solutions to reduce single-use plastics .

CO-PRODUCTION OF AMYLASE AND PROTEASE IN A HALOALKALIPHILIC ACTINOBACTERIA, *Nocardiopsis alba* KH-1(2) USING POTATO PEEL MEDIUM

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Haloalkaliphiles live and grow under high salinity and alkaline pH. Enzymes produced by these organisms are stable and function at high salt concentrations under alkaline pH. The present study describes the co-production of amylase and protease from a marine actinobacterium, *Nocardiopsis alba* Kh-1(2) isolated from the Kachhighadi, Gujarat Coast, India, using a growth medium that contained potato peel extract as a substrate. The amylase production was screened on a starch-agar plate. The amylase activity was measured after 96 hours of growth by flooding iodine on the plate. Similarly, the protease activity was determined on a gelatin agar plate. After the growth, the protease production was visualized by flooding the plates with Frazier's reagent. In both cases, the appearance of a clear zone of the hydrolysis of the respective substrate indicated the presence of the enzymes. In a similar manner, the growth media supplemented with the extract of potato peel was used for the detection of amylase and protease activities. Further, in the study, the effect of the potato peel extract was evaluated as a substrate in the growth medium for the production of amylase and protease in liquid culture under submerged conditions. The growth and protease and amylase activities were periodically monitored during the growth. The amylase activity was estimated by measuring the maltose using the DNSA method and the protease activity was determined by Anson Hagihara's method. The Amylase production was significantly higher than protease production. The production of amylase and protease was at 405 U/ml and 50 U/ml, respectively. The study reflected the efficient co-production of amylase and protease in a marine actinobacterium, *Nocardiopsis alba* Kh-1(2) using potato peel as a substrate for growth. The potential of waste raw materials as carbon and nitrogen sources for the production of commercially valuable enzymes in extremophilic microorganisms is highly significant.

Keywords: Haloalkaliphilic Actinobacteria, Amylase production, protease production, Co-Enzyme production, Raw carbon source

PRODUCTION OF AMYLASE FROM HALOPHILIC ACTINOMYCETES OF SEA ORIGIN USING POTATO PEEL AS CARBON AND NITROGEN SOURCE

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Kitchen waste is a great source of starch and sugars and thus can be used to support the growth of the microorganisms and production of value-added molecules including commercially potential enzymes. Potato, banana, corn, and sweet potato are frequently used in our diet, and their peel waste can be effectively managed through their applications in the microbial production of enzymes. This study investigates the production of extracellular amylases in

marine actinomycetes using kitchen waste as a raw starch source. Actinobacterial strain *Nocardiopsisalba* KaM-13 of marine origin was isolated and cultivated from the seawater of Kachhighadi Coast near Dwarika, Gujarat. For the optimization of the growth and amylase production, the selected isolate was cultivated in a liquid medium, with 4% Potato peel extract. The optimum amylase production was observed in the stationary phase after 4 days of growth. For the optimization of amylase production in KaM-13 isolate, the effect of different parameters was evaluated. Inoculum size, pH, temperature, salt concentration, and substrate concentration were selected for optimum amylase production. Based on the Amylase Production Index (API), the optimum amylase production and cell growth were evident with 2% inoculum, pH 8.0, 28 °C, 10% potato peel extract, and 5% salt. The study signifies the effective application of waste raw materials in the production of enzymes by extremophilic microorganisms.

TO EVALUATE THE RESPONSES OF PLANT GROWTH PROMOTING BACTERIA (PGPB) UNDER POT ASSAY CONDITION

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Plant-microbe communications in the rhizosphere determine plant health and soil fertility. Rhizobacteria are root-associated bacteria that can have a neutral, harmful, or beneficial effect on the growth of plants. Plant growth-promoting bacteria (PGPB) are diverse beneficial bacteria that can have the capability to increase the growth of plants by either direct or indirect phytostimulatory mechanisms. The objective of this study was to recognize and distinguish PGPB native to the Groundnut rhizosphere, which increases yield and plant growth. A total of 11 bacteria were isolated, out of which one (PGPB-25) was selected based on their *in vitro* plant growth-promoting attribute. PGPB-25 was selected for soil pot assay because of showing one or more PGPB characteristics like Nitrogen fixation, phosphate solubilization, Potassium solubilization, Zinc solubilization ability, Siderophore production, and exhibiting a strong ability to produce Indole acetic acid (IAA). G-22 variety Groundnut plant seeds treated with this PGPB-25 strain displayed considerably higher germination levels, plant growth, and increased length of root and shoot compared to non-treated control plants.

Keywords: Nitrogen fixation, Solubilization, Siderophore production, Indole acetic acid

BIODEGRADATION OF STONE

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Stone cultural heritage materials are at risk of biodeterioration caused by diverse populations of microorganisms living in biofilms. The microbial metabolites of these biofilms are responsible for the deterioration of the underlying substratum and may lead to physical weakening and discoloration of stone. Air pollutants in urban environments accelerate biodeterioration by serving as an additional nutrient source for the microorganisms. Current strategies to reduce biodeterioration and repair damage that has already occurred are discussed. Current techniques for assessing microbial populations and their effects are evaluated. Additionally, we describe two

new techniques for quantification of these interactions: microcomputer-assisted tomography (microCT) and atomic force microscopy (AFM).

Keywords: Biodeterioration, Biofilm, Microorganisms

BIOMETHANE PRODUCTION FROM GREEN WASTE BY MICROBIAL STIMULATION OF LAB

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The production of biomethane, an alternative source of energy, from green waste, was investigated in the laboratory scale using the simple single-state digesters of 5 liter working volumes. The digesters were fed on a batch basis with the slurry of green waste containing the average moisture content of 18%, and operated at ambient temperature (29-31°C) for 30 days. The total solid, volatile solids, moisture content and ash content of the wastes were studied. The materials used as feed were apple peel, papaya, mango peel, cabbage, banana peel without cow manure and using LAB. Varying volumes of digesters were employed for biomethane generation. The combustibility of the gas so produced was tested. The anaerobic digestion of fruit and vegetable wastes mixed with different waste took 30 days to produce biomethane (for complete digestion). Anaerobic digestion is very sensitive to change in pH and it is important to maintain pH of 6.8-7.5 for healthy system. The temperature of the digester and the environment also distresses the anaerobic digestion process. The search for alternative source of energy such as biomethane should be increased so that ecological disasters like environmental pollution, deforestation, desertification and erosion can be arrested.

Keywords: Green waste, LAB, Bio-Methane, Single-state Digester.

THE ROLE OF RHIZOBACTERIA AS PLANT GROWTH-PROMOTER TO ENHANCE CROP PRODUCTION

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Plant growth promoting rhizobacteria (PGPR) are a large collection of soil bacteria that are crucial for boosting plant growth and are interconnected with the rhizosphere. PGPR plays a significant role as a biofertilizer for soil productivity and sustainability as well as plays a crucial role to promote plant growth and development by improving biotic and abiotic stress tolerance and support hosts for plant nutrition. It also plays a crucial role in promoting plant growth and development as a biocontrol agent. PGPR enhances plant growth for some species and strains and affects plant growth by direct or indirect mechanisms including phytohormone production, siderophore production, nitrogen fixation, and enzyme production. In this study, isolation and screening of plant growth promoting rhizobacteria was done. Moreover, the effect of rhizobacteria on the crop was examined. The application of PGPR enhanced plant growth, improved crop production, and enhanced soil fertility.

Key words: Rhizosphere, PGPR, Enzymes, Crop production

MOLECULAR DIVERSITY AND PLANT GROWTH PROMOTING TRAITS OF BACTERIA FROM MEDICINAL PLANT

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The plant growth promoting endophytic bacteria are rich in plant tissues that play an important role in plant-microbial interactions and plant growth regulation. In this study, the endophytic bacteria isolated from medicinal plants were studied for their in vitro and in vivo plant growth promoting parameters. The isolates can benefit their host plant growth directly by solubilization of phosphate, fixing nitrogen, synthesizing siderophores, by producing ammonia, and indole acetic acid (IAA). Maximum isolates produced ammonia and siderophores at 28° C on respective medium. Metagenome analysis of soil was studied to determine the microbial diversity through the extraction of soil metagenomic DNA by harsh and soft lysis method. Furthermore, endophytic microbes produced extracellular cellulase on carboxymethylcellulose (CMC) agar medium that would help to increase soil nutrients and facilitate the bacterial entry to spread in plant tissue for defence response. The endophytic bacteria under study also tolerated high salt concentrations up to 20% NaCl (w/v) and could grow up to pH 8. The endophytes showed antimicrobial activity and enhancement in plant growth parameters, such as root and shoot length of *T. aestivum* L. that would be applicable in the agriculture field to improve crop quality.

OPTIMIZATION OF ALPHA AMYLASE PRODUCED BY HOST ASSOCIATED ACTINOBACTERIA USING RESPONSE SURFACE METHODOLOGY

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The microbial communities associated with hosts are capable of growing under stressful conditions and encompass remarkable gene clusters for natural compound production with unique properties. Actinobacteria produces a wide range of secondary metabolites such as enzymes, antibiotics, antibiofilm, and antioxidative and cytotoxic compounds. These allelochemicals not only provide protection to the host from other surrounding pelagic microorganisms but also ensure their association with the host. The harnessing of such metabolites from marine actinobacteria assures biotechnological, agricultural, and pharmaceutical applications. Hence, the present study was an attempt to isolate host-associated actinobacteria and to check its enzymatic potential. Among all isolated actinobacteria majority of strains were amylase positive. Starch agar medium supplemented with 0-15 % NaCl (w/v) was used for observation of starch utilization and colonial growth. Optimum values of various physical and chemical parameters for the production of enzymes under submerged state fermentation can be investigated using Plackett-Burman and Box-Behnken design matrix.

Keywords: Actinomycetes, Amylase, Optimization, RSM

WOLBACHIA FOR DENGUE CONTROL

Merja Krupa, Vadhadiya Madhavi and Sanghani Mansi

As we all know The mosquito born diseases are always been a major problem the number of people affected by mosquito-borne diseases is rapidly growing and we need to prevent/control it. Dengue cause by the virus that spread by the mosquito aedesaegypti. Here we describe the effect and prevention of dengue by the help of bacterium called wolbachia. The bacterium Wolbachia has been interested topic for microbiologist. The intracellular inherited bacterium useful to control mosquito born disease and such as dengue, malaria, chickengunya etc. Also here described that why not insecticides and why wolbachia ?Whywolbachia is more useful ? Current strategies to control mosquito born disease and their spreading has already occurred are discussed. Additionally we also describe, the transinfection of bacterium into mosquito and methodology.

Keywords: Wolbachia, Dengue, Aedesaegypti

MONKEYPOX VIRUS

Gami Urvashi, Detroja Devanshee, Raiyani Neha, Ghetiya Rutvi

Monkeypox virus (MPXV) is an enveloped double- stranded DNA virus that results in a smallpox-like human disease. This causative organism belongs to the Orthopox virus genus. It is known to affect the neurological, respiratory and gastrointestinal systems. The past few decades have seen endemic outbreaks of this viral infection due to the eradication of smallpox and subsequent laxity in vaccination efforts. Since it was initially diagnosed in 1970 in the Democratic Republic of Congo, it has spread too many countries Worldwide, including the United States of America, becoming a disease of significant epidemiological importance. The most recent outbreak occurred in 2022.

Keywords: Double stranded DNA virus, Family: - Poxviridae, Genus: - orthopoxvirus, Species: - Monkeypox virus

CONVERSION OF GREEN WASTE INTO VALUE ADDED PRODUCTS

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Green refuse, leaf litter, cut grass, residues of pruning weeds and other organic matter discarded from gardens and greeneries but exclude organic waste of the type obtained from municipal collections. These green wastes would land in dumping sites, or will be burned, if not collected and processed contributing to the large scale contamination of land, water and air. Leaves accumulating in the urban and suburban locations such as sidewalks, lawns, and playgrounds are not only an unseemly sight but adds to the overall problem of municipal solid waste (MSW) disposal. In India and several other countries, foliage is often piledup and set on fire. The resulting ash returns some of the NPK content of the foliage to the soil but much of nitrogen,

phosphorous, and organic carbon gets lost. The burning of leaves also adds to air pollution and global warming. Green waste when decomposes in soil may release methane and foul odors, before getting converted into humus. However green waste can be a potential resource for energy and other value added products, if properly processed. The present review aims at summarizing different processing options for green waste towards energy production and value added product generation. Green waste is mostly dealt with aerobic treatment (composting), anaerobic treatments, incineration, biomass briquetting, cellulosic ethanol from biomass, biohydrogen production, bioplastic etc. This review encompasses conversation of neem leaves into soap and orange peels into facepack.

Keywords: green waste, value added products.

CULTIVATION OF PLASTIC DEGRADING BACTERIA

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The growing worldwide production of synthetic plastics leads to increased amounts of plastic pollution. Even though microbial degradation of plastics is known to be a very slow process. This capacity has been found in many bacteria, including invertebrate symbionts, and microscopic fungi. Research in this field has been mostly focused on microbial degradation of polyethylene, polystyrene and polyethylene terephthalate (PET). Several methods are available today for detecting processes of plastic degradation and measuring their rates. PET degradation by recombinant hydrolases from Thermophilic Actinobacteria happens to be the most efficient among the currently known plastic degradation processes. Various approaches to accelerating microbial plastic degradation are also discussed for our sustainable future.

Keywords: Synthetic plastics, microbial degradation, Thermophilic Actinobacteria, detection techniques.

IMMOBILIZATION OF EXTRACELLULAR AMYLASE ON VARIOUS MATRICES FROM HALOALKALIPHILIC RHIZOSPHERIC ACTINOBACTERIA

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Enzymes are biological catalysts that incredibly speed up chemical reactions, and they are extensively distributed in plants, animals, and microbes. Enzyme immobilization can be defined as the confinement of enzyme molecules into various support matrices physically, chemically, or both, in such a way that it retains their activity. Compared with free enzymes in solution, immobilized enzymes have a greater advantage of enhanced stability, recovery, and repeated uses. Enzyme immobilization provides an excellent base for increasing the availability of enzymes to the substrate. The efficiency of several organic and synthetic supports for enzyme immobilization has been explored. In this study, the extracellular amylase was immobilized by various methods such as entrapment, physical adsorption, affinity binding, covalent binding, and ionic binding. The matrices used included sodium alginate, agar-agar, polyacrylamide, chitin

chitosan, polyvinylchloride, silica gel, nitrocellulose membrane, DEAE cellulose, and seralite SRA. The amylase activity was observed maximum with covalent binding and physical adsorption methods using silica gel of various pore sizes. Affinity binding using nitrocellulose membrane and ionic binding using DEAE cellulose also showed significant activity. In contrast, amylase immobilization through the entrapment method using agar-agar and polyacrylamide showed relatively low enzyme activity compared to other immobilization techniques.

Keywords: Extracellular amylase, Immobilization, Covalent binding

MYCORRHIZAL FUNGI AS A POTENTIAL BIOFERTILIZER

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The world's human population continues to increase, posing a significant challenge in ensuring food security, as soil nutrients and fertility are limited and decreasing with time. Thus, there is a need to increase agricultural productivity to meet the food demands of the growing population. Fungi play a significant role in agriculture and are required for plant growth. Because of the diversity of fungus habitats and the necessity to compete against a vast variety of other fungi have evolved many survival methods. Scientific journals have investigated the mutualistic interaction between plant roots and Arbuscular Mycorrhizal Fungi (AMF) in order to attain the goal in a sustainable manner. AM-Fungi are ubiquitous and form a mutuality relationship with roots of most plant. The biofertilization method using AMF has been shown to be a good alternative to chemical fertilization practices. It has been identified as having numerous possible applications, including plant fertilization (phosphorus, nitrogen, and other micronutrients), stress relief (protecting plants from pests and diseases), and abiotic stress relief (drought, salinity, heavy metals, low and high temperature). AMF increases plant growth and output by establishing itself within the host root using a set of genes and meeting the needs of the host. This review focuses on the crucial function of beneficial soil fungus as a cost-effective, nontoxic, and environmentally friendly method to rhizosphere management to boost plant development and productivity.

Keywords: Arbuscular Mycorrhizal Fungus, Biofertilizer, Plant growth, Fertilization, Rhizosphere

PRODUCTION OF AMYLASE IN HALOALKALIPHILIC ACTINOBACTERIA, *NOCARDIOPSIS ALBA ALS-5* FROM A POLLUTED MARINE HABITAT, ALANG (BHAVNAGAR)

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The oceans are considered the origin of life on Earth and represent a vast range of habitats that facilitate the various forms of life. Enzymes from Haloalkaliphilic microorganisms have recently focused attention on their potential and suitability in various applications. This study investigates the production of extracellular amylase in marine actinomycetes using kitchen waste as the raw

source of carbon and nitrogen. Firstly, the actinobacterial strain, *Nocardiopsisalba ALS-5*, earlier isolated in our laboratory from Alang, Bhavnagar Coast, Gujarat was revived on a starch casein agar plate. The amylase production in this strain was then assessed on the solid growth media supplemented with different fruits and vegetable peels as substrate. Peels of potato, carrot, banana, orange, apple, melon, pomegranate, and corn waste, with appropriate salt, and alkaline pH were used for the growth of the actinobacterial strain and amylase production. After a growth of 96 hours, the amylase production was observed by flooding the iodine on the solid media. Although the *Nocardiopsisalba* strain ALS-5 produced significant amylase on all raw substrates used in the study, the maximum amylase production evidently was with the medium containing potato peel. Therefore, the potato peel was used as a raw substrate in the production medium for further studies. The growth of the organism in liquid culture was monitored by the optical density while the amylase activity was determined by the DNSA method. The optimum growth of the organism was obtained on the 3rd day, while the optimum amylase production was evident on 5th day of the growth. The study projects the suitability and significance of waste raw materials for the growth and production of enzymes in extremophilic microorganisms.

Keywords: Haloalkaliphilic Actinomycetes, Amylase production, Raw substrates

CHARACTERISTICS OF AMYLASE FROM HALOPHILIC ACTINOBACTERIA, *NOCARDIOPSIS ALBA KH-3(14)* FROM KACCHIGADI COAST, GUJARAT

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Marine habitats harbor extremophilic microorganisms that are capable to grow under high salinity and usually alkaline conditions in combination. Actinomycetes possess abilities to produce secondary metabolites and a range of enzymes. The organism was isolated from Kachhigadi, Near Dwarka, Coastal Gujarat. Amylase was produced in this organism in liquid culture. The maximum amylase production was evident in the exponential phase on 3rd-day of the growth. The amylase purification was attempted by ammonium sulfate fractionation at a low temperature. However, it was found that with increasing concentrations of ammonium sulfate, the amylase activity was significantly lost due to the inhibitory effect. Therefore, the cell-free crude enzyme preparation was characterized for different parameters. The effect of pH, temperature and salt concentrations was assessed on the amylase activity. Similarly, the effect of organic solvents (methanol, ethanol, acetone, n-hexane, benzene, haptin, butanol, propanol) at 20%, surfactants (SDS, TritonX100, tween-X20, tweenX80) at 2.5%, metal ions (K_2HPO_4 , CaCl, $HgCl_2$, Na_2HPO_4 , $MnSO_4$) at 50mM, chelator (EDTA) at 50mM and inhibitors (thiourea, B-mercaptoethanol, urea) at 50mM were examined for their effect on the amylase activity. The optimum amylase activity was observed at 57 °C, pH 8.0, and 5% salt concentration. While haptin, TritonX100, and $CaCl_2$ positively affected the enzyme, urea had an inhibitory effect.

Keywords: Extremophiles, Haloalkaliphilic actinomycetes, Enzyme purification, ammonium sulfate fractionation, Amylase characteristics

“ISOLATION AND BIOCHEMICAL IDENTIFICATION OF LACTIC ACID BACTERIA FROM DIFFERENT MILK SOURCES”

Arpita D. Solanki, Akshi B. Sojitra, Dirgha J. Talapara, and Nidhi S. Sorathiya

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Lactic Acid Bacteria (LAB) are a group of Gram Positive, non-sporulating, anaerobic or facultative aerobic cocci or rods. LAB is naturally present in milk. Identification of LAB was done based on morphology, physiology and biochemical characteristics. Probiotics are defined as live microorganism which, when provided in sufficient amounts, have a beneficial effect on human health. Probiotics may minimize disturbance of the intestinal microbiota. Cow milk contains wide microbial diversity, composed mainly of Lactic acid bacteria(LAB), which are used as Probiotics in both human and animal husbandry. Identification of Lactic acid bacteria (LAB) was done by based on morphological, cultural, Physiological and different biochemical tests. Human milk is the main source of nutrition for infants and the transmission of various microorganisms. The Lactic acid bacteria(LAB) in breast milk allow for the establishment of the gut microflora of infants. Goat milk differs from cow or human milk in having higher digestibility of protein and fat, alkalinity, buffering capacity, and certain therapeutic values in medicine and human nutrition. Lactic acid bacteria have been categorized as Probiotics and play a crucial role in human health by stimulating the supply of nutrients, shaping the immune system, and preventing the colonization of pathogenic microbes.

Keywords: Lactic Acid Bacteria, Screening, Probiotics, Identification of LAB

RECAP ON PROBIOTIC MICROORGANISMS

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Probiotics, live cells with different beneficiary characteristics, have been extensively studied and explored commercially in many different products worldwide. Hundreds of scientific research have proven their benefits to human and animal health. The interaction of the gastrointestinal microflora with the human host has been the subject of considerable debate in the last decade. Manipulation of the enteric microflora with probiotic organisms has been attempted in a wide range of clinical settings, hoping to achieve health benefits in the host. Probiotics have become an integral part of the complex world as biologics, pharmaceuticals, food, and nutritional supplements due to their potential to provide health benefits. Recent studies have revealed many opportunities for their use in several fields of medicine, such as in reducing the level of cholesterol in the body, cancer therapy, human immune system regulation, skin regeneration, pancreas necrosis, cirrhosis of liver treatment, regulation of post-antibiotic bowel function, constipation and digestive disorders in infants. However, the probiotic viability and stability during processing, storage, and under adverse conditions during gastrointestinal digestion are significant challenges in probiotic product development.

Keyword: Probiotics, Gastrointestinal microflora, Adverse conditions

CHARACTERISTICS OF AMYLASE FROM HALOPHILIC ACTINOBACTERIA, *NOCARDIOPSIS ALBA KH-3(14)* FROM KACHHIGADI COAST, GUJARAT

Ami Dattani, Khushali Bhatt, Hasti Ramavat and S.P. Singh*

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Marine habitats harbor extremophilic microorganisms that are capable to grow under high salinity and usually alkaline conditions in combination. Actinomycetes possess abilities to produce secondary metabolites and a range of enzymes. The organism was isolated from Kachhigadi, Near Dwarka, Coastal Gujarat. Amylase was produced in this organism in liquid culture. The maximum amylase production was evident in the exponential phase on 3rd-day of the growth. The amylase purification was attempted by ammonium sulfate fractionation at a low temperature. However, it was found that with increasing concentrations of ammonium sulfate, the amylase activity was significantly lost due to the inhibitory effect. Therefore, the cell-free crude enzyme preparation was characterized for different parameters. The effect of pH, temperature and salt concentrations was assessed on the amylase activity. Similarly, the effect of organic solvents (methanol, ethanol, acetone, n-hexane, benzene, haptein, butanol, propanol) at 20%, surfactants (SDS, TritonX100, tween-X20, tweenX80) at 2.5%, metal ions (K₂HPO₄, CaCl₂, HgCl₂, Na₂HPO₄, MnSO₄) at 50mM, chelator (EDTA) at 50mM and inhibitors (thiourea, B-mercaptoethanol, urea) at 50mM were examined for their effect on the amylase activity. The optimum amylase activity was observed at 57 °C, pH 8.0, and 5% salt concentration. While haptein, TritonX100, and CaCl₂ positively affected the enzyme, urea had an inhibitory effect.

Keywords: Extremophiles, Haloalkaliphilic actinomycetes, Enzyme purification, ammonium sulfate fractionation, Amylase characteristics

MICROBIAL ANALYSIS OF SEAFOOD AND FISH

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Seafood and fish are a main sources of animal protein in the diet. Nowadays consumption of seafood and fish has increased, because of their health advantages over red meats. Fish catches can be done from lakes, rivers and seas whose water can be contaminated which can lead to transmission of pathogenic microorganisms and toxins from fish and seafood to human. Seafood-associated infections are caused by a variety of bacteria, viruses and parasites that can cause the sever level of diseases. Prevention of seafood-associated infection requires the mechanisms of contamination that are amenable to control and aetiological agents. For controlling the fish and seafood contamination there will be need of continuous surveillance. Present overview will help in explaining pathogen responsible for seafood and fish spoilage.

Keywords: Seafood, microbiology, infection, pathogen

MYTHS AND FACTS OF PROBIOTIC

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Lactic acid bacteria represents one of the most significant groups of Probiotic organisms. Probiotic food or supplements that contain live microorganisms intended to maintain or improve the “good” bacteria in human body. Probiotic food some times helpful but at so often if not uses properly they are harmful. Infection in human and animals. It can cause digestive discomfort and side effects such as diarrhea, constipation, bloating and gas. Probiotic are live microorganisms promoted with claims that they provide health benefits when consumed generally by improving or restoring the gut microbiota. Probiotics are considered generally safe to consume but may cause bacteria host interaction and unwanted side effects in rare cases. This review paper encompasses myths & facts about Probiotic product.

Keywords: Lactic acid bacteria, Probiotic

ORGANIC WASTE INTO WEALTH

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Solid waste disposal is a major problem in the world. Agricultural residue, waste from the temple, domestic waste, and non-edible oil cake waste contains carbon content. Flower and Fruit peel waste is also one of the major concerns. They have applications in many industries like perfumes, cosmetics, food, soap, liquor, textile, and in agriculture also. The present study was carried out for utilizing flower waste and fruit peel waste into different value-added products like composting from flower waste to produce biofertilizer, its study on the growth of mung plant (*Vignaradiata*), conversion of different waste fruit peels into dry herbal face pack, use of green waste in making organic soaps. Activities of the above products were checked for their physical & chemical analysis, and their anti-microbial activity was checked against *E.coli*, *S. aureus*, and *B.megaterium*. The herbal soaps were formulated using orange peel, dry neem powder, and rose petals in a ratio of 1:2:1. The utilization of waste will resolve to some extent the problems of floral waste disposal and ultimately reduce the land, water and environmental pollution. It is our duty to save the environment's beauty.

Keywords: Waste reduction Bio-Conversion, Herbal soap, face pack.

A STUDY ON OYSTER MUSHROOM

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Oyster mushroom (*Pleurotus* species) is commercially important in the world mushroom market. It is widely cultivated and consumed in different parts of the world. Many people admire the mushroom due to its taste, flavor, high nutritional values, and some medicinal properties. *Pleurotus* are generally rich in proteins with essential amino acids, physiologically important polysaccharides and essential fatty acids, dietary fibers, important minerals, and some vitamins. The presence of some bioactive substances, majorly polysaccharide-protein complex in the genus

Pleurotus has been reported to confer some pharmacological potential such as antimicrobial, antioxidant, anticancer, anti-inflammation, anti-hypercholesterolemia, anti-hypertensive, anti-diabetic, hepato-protective and anti-allergic activities. The high nutritional value and potential medicinal uses suggest that the oyster mushrooms are pharmacologically important as functional foods.

Keywords: Pleurotus species, pharmacological potential, medicinal uses

POTENTIAL OF MICRO ALGAE AS BIOFUEL

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Micro algae is a type of autotrophic microbe found in various water places. It can be used for production of bio-oil and bio-diesel. Energy conservation program uses micro algae for production of biofuel which is sustainable and eco-friendly. There are various methods for cultivation of micro algae and ways to get bio-oil. The oil produced by algae is considered as bio-energy. The bio-oil produce from algae is a potential substituted for fuel in use. There is need to produce bio-oil on the large scale and to make it available as green energy.

Keywords: Micro algae, Bio-oil, Bio-energy, Potential substituted.

STUDY OF MENOPAUSAL WOMEN IN CERVICAL CANCER SCREENING

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Introduction: India accounts for about 20% of cervical cancer cases reported from the world. More than three-fourth of these patients are diagnosed in advanced stages leading to poor prospects of long term survival and cure. Early detection of cervical cancer is possible with Awareness and knowledge. The proportion of women who undergo testing ranges from 2.6% to 6.9% among women in communities in India. It has been found that in many developed countries the annual incidence and prevalence of cervical cancer has decreased by 50%-70% after menopause yearly screening of cancer as a part of their routine checkup. This led to an extensive search for prediction of correlation between menopause and High risk of HPV virus infection, currently under testing in different countries. Methods & Material: We had screened 108 menopausal women during our study period i.e. 3 months. in GG Hospital, Jamnagar. HPV infection screening method was PAP test as our routine Cytopathology practice. Discussion: our study found minimum age of marriage was 14 years and maximum 40 years with mean of 20.01 and standard deviation of 4.23. Menarche found was minimum 12 years to 28 years maximum with mean of 13.5 and standard deviation of 1.60. Age at the time of screening we found was minimum 26 years to 86 years with mean of 52.17 and standard deviation of 11.74. Conclusion: We found menopause as high risk factor of HPV infection. It is suggested that menopausal women should screen themselves annually.

Keywords: Human Papilloma Virus, Screening, PAP, Menopause

A STUDY OF PIGMENT PRODUCING BACTERIA AND EVALUATION OF IT'S POTENTIAL

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Generally, Many of the Fruits are thrown in the garbage or fed to livestock. Pigment producing Microorganisms generally found on skin of it and can be isolated from Fruit wash. They produce several pigments which are of various colors and composition. Natural Pigments have been widely used in different fields in on daily basis life such as Foods or feeds, Textiles, Cosmetics, Pharmaceuticals, Antimicrobial properties, Anticancer properties, Cytotoxic properties and remarkable Antioxidant properties, They are also used in dyeing Cloth. Secondary Metabolites of Bacterial origin include various Enzymes, Pigments, Antibiotics. Pigments were isolated and purified from several bacteria. Several Gram Positive and Gram Negative Bacteria are selected to check the antimicrobial activity of Pigments, from different Pigment producing Microorganisms isolated from fruit wash.

Keywords: Pigment, Antimicrobial Activity, Extract.

A STUDY ON SINGLE CELL PROTEIN

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Single cell protein refer to edible unicellular microorganisms. Industrially, they can be produced from algal biomass, yeast, fungi. The single Cell protein technique has become a popular technology in recent days, which address two major issues: increasing World protein deficiency with increasing world population and the generation of substantial industrial wastes with an increased production rate. SCPs can be used as a protein supplement in human foods or animal feeds. SCP are the edible dead, dry cells of microorganisms that can be used as protein source in human food and animal feed, either as whole living cell or in dried form. It is convenient to use microorganisms for production of SCP as they grow and have high protein content. Due to increase in population around the globe, the globe demand for high quality protein rich foods have increased. Novel approach for alternative sources are needed to meet the global challenge. several raw materials like molasses, corn steep liquor and crude waste material. food grade yeast was produced as single cell protein as molasses crude substrate.

Keyword: Food grade yeast, molasses, single cell protein

PREFILLED SYRINGES **PRINCE N. JODHANI**

To solve the problem's of previous drug delivery in accuracy, sterility, safety, quality etc. this process of prefilled syringe was introduced. The objective of this article is to provide information regarding prefilled syringes, it's advantage, material used to make prefilled syringes, step's to use prefilled syringes.

A REVIEW ON AGRICULTURAL IMPORTANCE OF *TRICHODERMA* AS BIOFERTILIZER AND BIOCONTROL AGENT FOR PLANT PATHOGENIC FUNGI

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Excessive usage of chemical fertilizers or pesticides can influence environmental pollution which lead to biomagnification. Plant growth promoting and disease controlling advantageous microorganisms is taken into consideration as an alternative to chemical fertilizers or pesticides. *Trichoderma*'s ability to stimulate plant growth and control plant diseases is widely known. This review is being carried out to demonstrate significant contribution of *Trichoderma* in agricultural production. The genus *Trichoderma* is a diverse group of free-living fungi in the family *Hypocreaceae*, commonly present in all soils. These Ascomycetes fungi are opportunistic, avirulent plant symbionts inhabiting root ecosystems and parasites on other groups of fungi. The beneficial role of fungi from the *Trichoderma* genus and its secondary metabolites in promoting plant growth, ability to produce volatile compounds, solubilization of phosphates, uptake and use efficiency of macro and micro-nutrients, activation of plant secondary metabolism, decomposition, mycoparasitism, cellulose degradation, potential for antagonistic activity against disease-causing fungi and inhibition of growth of harmful root microflora makes it interesting for application in environment friendly agriculture. *Trichoderma* sp. initiate some signalling pathways that includes Heterotrimeric G protein, MAP kinase and cAMP pathway for biocontrol activity. This includes the control of pathogens such as *Rhizoctonia*, *Phytophthora*, *Rhizoctonia*, *Sclerotinia*, *Phythium*, *Fusarium*, *Sclerotinia* species and *Galumannomyces*. The goal of this review is to highlight the value of *Trichoderma* as a bio-fungicide and biofertilizer in agriculture.

Keywords: *Trichoderma* sp., biofertilizer, biocontrol agent, Plant pathogens, Mode of action, antagonism

CHARACTERIZATION OF POLYHYDROXYBUTYRATE (PHB) PRODUCER MICROORGANISMS

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Poly-3-hydroxybutyrate (PHB) is a biological polyester present in bacteria and eukaryotic cells belonging to the family of Polyhydroxyalkanoate (PHA). PHB is a product of microbial secondary metabolism. They are synthesized by bacteria through a process called biosynthesis, which involves the conversion of carbon sources into polymers. PHB has the potential to replace plastic in many industries due to its biodegradability and low environmental impact. It can be used in a wide range of applications, such as packaging, medical implants, and even as an energy source and other materials. In addition, it has been studied for its potential use in drug delivery systems, tissue engineering and it can be used to reduce our reliance on non-renewable resources such as petroleum-based plastics. As such, it has become an important material for many industries and promises to play a major role in the future of sustainable materials. The work done

on soil sample collected from Savla Steel Industries, Rajkot. Isolation and characterization of PHB producers from the collected sample which will be discussed in the current research.

Keywords: Biosynthesis, Biodegradability, PHB.

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ZOOLOGY

**PEOPLE'S PERCEPTION ON SNAKE BITE:
A CASE STUDY FROM SAURASHTRA
AUM AGRAVAT**

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Snakebite envenomation is a neglected disease that affects 1.8 to 2.7 million people every year, causing 81,000 to 138,000 deaths and leaving at least 400,000 people with permanent physical disabilities and psychological sequelae. Snakebites have a heavy impact on impoverished rural communities. In India the persons at risk of snakebite is around 50 million. The number of deaths registered is less than the actual number of deaths occurring due to snake bite. India accounts for almost 80% of global snakebite deaths, with over 64,000 people dying every year. It's because our psychology towards the snakes and it leads to unawareness or wrong information about the snakes, People in India take snakes & snake bite in religious way not in scientific way, cause of lack of awareness and their stubborn beliefs they lose their lives, it's important to indicate this topic on global level & in studies also, we have to be aware of this situation, we can save people & snakes by changing people's psychology on snakes by breaking their beliefs and showing them the truth. We have travelled across Saurashtra and north Gujarat survey and create awareness about people's perspective on snakes.

**DECIPHERING FACTORS LEADING TO SURGE OF
HYSTERECTOMY IN PAST DECADE
CHAITALI BHATTACHARJEE**

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In various parts of India, we have observed a surge in the number of women undergoing hysterectomies in the past years. In midst of 15-49 age, there's hysterectomy prevalence in 17 out of every 1000 women as per records. Eventually, it has led us to not only think about factors leading to this stage but also about suspicion and misuse of this procedure, while there's an intense debate on its health effects. This paper presents to you findings based on a survey of medical practitioners (sp. In gynaecology & obstetrics) perspectives across India analysing the factors leading to the surge of this procedure and various practitioners' perspectives on its effects. Hysterectomies are performed across the country due to various reasons which can or can't be treated by specific medication in various periods. This may have severe physical, reproductive, and socio-psycho health effects. Patience & belief towards alternative options and awareness related to one's body is a must and should be provided to make more informed choices.

**CRISPR/CAS9 SYSTEM
VISHAL MAKWANA**

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A genetic manipulation tool derived from the defense system of certain bacteria against viruses and plasmids. This method is easy to apply and has been used in a wide variety of experimental models, including cell lines, laboratory animals, plants, and even in human clinical trials. The CRISPR/Cas9 system consists of directing the Cas9 nuclease to create a

site-directed double-strand DNA break using a small RNA molecule as a guide. A process that allows a permanent modification of the genomic target sequence can repair the damage caused to DNA. In the present study, the basic principles of the CRISPR/Cas9 system are reviewed, as well as the strategies and modifications of the enzyme Cas9 to eliminate the off-target cuts, and the different applications of CRISPR/Cas9 as a system for visualization and gene expression activation or suppression. The potential application of this system in the treatment of different diseases, such as pulmonary, gastrointestinal, hematologic, immune system, viral, autoimmune and inflammatory diseases, and cancer.

INHERITANCE OF SEASON ON PREVALANCE OF CANINE PARVO VIRUS INFECTION AT GUJARAT VETERINARY RESEARCH AND DIAGNOSTIC CENTER (GVRDC) IN AHMEDABAD, GUJARAT

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Canine parvovirus (CPV) is the most important viral cause of acute canine enteritis leading to severe damage to the intestinal barrier. The effects of parvovirus are lethargy; loss of appetite; abdominal pain and bloating; fever or low body temperature (hypothermia); vomiting; and severe, often bloody, diarrhea and if the treatment is not done within 3 days it can cause death. It has been seen that dogs might develop chronic disorders after surviving CPV infection. There are a total of 115 samples have been taken and its get analyzed by the Rapid Chromatographic assay test. Most of the samples are collected during the winter and monsoon season. And the reports are analyzed by dividing the seasonal susceptible parvovirus. The seasonal prevalence is done by dividing the whole year into 6 seasons. Shishir (Jan-Feb), Vasant (March – April), Grisham (May-June), Varsha (July-August), Sharad (Sept-Oct), and Hemant (Nov-Dec). Out of 115 samples, the percentage of positive samples is 66% and negative samples are 34%. The susceptible season for the parvovirus is Shishir & Varsha. As from the reports of GVRDC, the parvovirus has been seen mostly in puppies at the age of 1-5 months. Because the parvovirus is more susceptible in the winter season which is the breeding season of canine species and thus due to low immunity it gets more affected.

DIVERSITY OF MOLLUSCAN FAUNA AT DIU GHEDIYA KRISHNA, RAMOLIYA ABHAY and GADHAVI M K

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The intertidal zone is home to various invertebrate animals and the most dynamic marine environment. Among the entire invertebrate phylum, the Mollusca is the second largest phylum in the coastal tropical climate. Mollusca are under pressure due to pollution & habitat change. Mollusca are also under pressure as exploitation is high due to their high demand for souvenirs and ornaments. This paper documents the diversity of phylum Mollusca at the intertidal area of Diu. The study was carried out during the winter season from Nov 2022 to January 2023 for the collection of molluscs. Molluscs were identified using standard identification keys. Total 17 molluscs were recorded from the site.

**CHECKLIST OF ORNAMENTAL MOLLUSCS COLLECTED FROM
MARKETS OF SELECTED SITES OF GUJARAT**

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Marine Molluscs are economically very important and they are exploited by men for various purposes since prehistoric times. The sea coast of India has many true coastlines. Gujarat has the longest coastline of 1600 km. Mollusc is the second largest phylum after arthropods. Ornamental mollusc means any species that is marketed for their beauty or aesthetic purpose and used in decoration. In Gujarat Dwarka, Beytdwarka and Somnath has rich number of ornamental mollusc diversity. In said study we have try to make checklist of ornamental mollusc species found on this sites. For that we have done market survey of local vendors and purchased species which are sold exclusively as ornaments. And identify it up to the species level. In the result we found 51 species which are sold as ornaments on these 3 sites. The maximum contribution was from class gastropod followed by bivalve and scaphopod.

**DIVERSITY OF MOLLUSCAN FAUNA AT JODIYA PORT, MARINE
NATIONAL PARK, GUJARAT**

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Marine national park in the Gulf of Kutch is situated on the southern shore of the Gulf of Kutch. In 1980 area of 270 km² from Okha to Jodiya was declared marine sanctuary. The present study was conducted on the Mollusca diversity in and around Jodiya port of Jamnagar district. The study was carried out during post monsoon and pre winter season of 2022. Dead Mollusca were collected then sorted and identified as per standard key. A total of 22 species of Mollusca were recorded from Jodiya port. Total 6 dominant species were observed under the molluscan community encompassing two measure class namely Bivalvia and Gastropoda.

NATIONAL PARKS AND SANCTUARIES OF INDIA
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The wildlife protection act of 1972 empowers the state government to constitute national park and sanctuary. Whether within a sanctuary or not by reason of its ecological, faunal, floral, geomorphological or zoological association importance needed to be constituted as national park and sanctuary for the purpose of propagating or developing wildlife therein or its environment. Total 106 national park in India conserving area of 44,402.95 km², which is 1.35% of the geographical area of the country, And there are 567 existing wildlife sanctuary in India, conserving area of the 122,564.86 km² which is 3.73% of the geographical area of the country. The importance of national park and sanctuary is they give animal a safe place to breed and survive and endangered plant and animal are protected in national parks and sanctuaries. They protect places of natural beauty.

CONSERVATION STATUS OF RED WATTLED LAPWING IN INDIA SISODIYA JANAKSINH, PUNDHERAHERIT and CHOVIATIYA S K

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The present study was carried out to check the conservation status of red-wattled lapwing because of its agricultural importance as they maintain the insect's population. They have the most distinguishable character which is fleshy red wattle in front of the eye and the red ring around the eye. They are best known for their loud annoying alarm calls did he do it or pity to do it that is why it is called "the did he do it bird". They are threatened by dogs, foxes, crows, etc. And another new farming technic in their egg incubation period. We can take care when we use new farming technic and dogs should be prevented around the nesting sites.

FEEDING BEHAVIOUR OF ROSE RINGED PARAKEET (*PSITTACULA KRAMERI*) AT LAJAI VILLAGE, MORBI, GUJARAT AKSHAY MASOT, JAY RANIPA and GRISHMA PIPARIYA

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This research aims to investigate and understand the feeding habits of *Psittaculakrameri* commonly known as rose-ringed parakeet native to Asia and Africa. By studying the feeding behavior of the species we can gain insight into its ecological role and interspecific relation with other species as well as its damaging behavior on fruits. The research will also investigate any potential factors that influence the feeding behavior of *Psittaculakrameri* such as the availability of food resources and the environment. Some individuals are observed to feed exclusively on one type of food in a natural habitat. The parakeets were observed to forage in large flocks and were seen feeding on guava and fig fruit. Overall, this research provides valuable insights into the feeding behavior of *Psittaculakrameri* and highlights the need for research to understand the ecological role of these birds in their natural habitats.

DANCING MOLECULES' SUCCESSFULLY REPAIR SEVERE SPINAL CORD INJURY'S RIYA RAJYAGURU and KAVITA YADAV

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Northwestern university researchers have developed a new injectable therapy that harnesses "DANCING MOLECULES" to reverse paralysis and repair tissue after severe spinal cord injuries. The drug has shown a good improvement after receiving single doses in animal model. Bioactive signals to trigger cells to repair and regenerate, the break through therapy. The main aim of these research therapy that can prevent individuals from becoming paralyzed after major trauma or disease.