Proceedings

International Conference on Advances in Biosciences and Biotechnology

Theme

'Bioresources & Biodiversity'

ICABB-2019

(January 31st - February 2nd, 2019)

Organized by

Department of Biotechnology
Jaypee Institute of Information Technology, Noida
A-10, Sector - 62, Noida, Uttar Pradesh, India

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INTERNATIONAL CONFERENCE ON ADVANCES IN BIOSCIENCES AND BIOTECHNOLOGY – ICABB-2019

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About the Institute

Jaypee Institute of Information Technology (JIIT), Noida was established in the year 2001 and has been declared as a "Deemed to be University" under Section 3 of UGC Act 1956 in the year 2004. JIIT's state-of-the-art, environmentally conditioned campus comprises smart buildings with Wi-Fi connectivity covering the Academic Block, Business School cum Research Block, Faculty Residences, Student Hostels and Annapurna. Well equipped modern laboratories and an intellectually stocked Learning Resource Centre with books and E-Resources provide a pleasant and stimulating ambience. JIIT has been constantly ranked amongst the top engineering Institutes in Delhi NCR. The lush green campus of Jaypee Institute of Information Technology, Noida, Uttar Pradesh, India at Sector-62, Noida is spread around 15.5 acre with an auditorium (capacity 1800 people), lecture halls, guest rooms, and hostels that may be used / booked for conference related activities. A dedicated dining hall - Annapurna - is available in the campus that provides sumptuous food round the year.

About the Host Department

The Department of Biotechnology at JIIT, NOIDA, established in 2002, remains committed to provide research-informed teaching and learning, and a vibrant R & D environment. Faculty with rich research exposure in academia and industry both in India and abroad contribute to the department academic core.The field of biotechnology is steadily growing in India. In response to continuously evolving technology and industry needs, our curriculum is designed to impart skill sets enabling adaptation to academia, research, and industry. The curriculum provides engineering interface and integrates core subject area knowledge with professional development; focusing on entrepreneurship, analytical and research skills. With a research grant of around 3 billion Indian rupees dispersed in the two major core area of national importance viz. Microbial and plant biotechnology and Centre for Emerging Diseases, from premier national funding agencies namely, the Department of Biotechnology (DBT), the Department of Science and Technology (DST), All India Council for Technical Education (AICTE), Indian Council for Medical Research (ICMR) and Department of AYUSH. The department had trained thousands of graduate and post-graduate students, since its inception in 2002. Currently, the department has 44 PhD, 27 M.Tech and around 240 graduate students. The research emphasis is reflected in the active doctoral program, publications in international/national journals, and sponsored research projects.

About the Conference

The department organizes international conferences annually. The International Conference ICABB-2019 is the second in its series and aims to provide a global platform to researchers, academicians, technocrats, students and stake holders to discuss and showcase the recent advances in the core areas of biotechnology. This year, the theme is 'Bioresources and Biodiversity' that will implicate the abundant resource base available in nature and its possible utilization as a raw material or sources of unprocessed / processed good to develop a sustainable society, emphasizing on the growing concern over un-sustainable utilization of resources, growing environmental damage and health issues. Keynote, oral and poster presentations from international and national scientists of repute will append the participants from different sectors of Biotechnology and allied areas about their research output and their impact on society at large.The conference will provide an opportunity to participants, delegates and researchers along with other stakeholders to share scientific advancements in the sub-domains of bioresources, health, environment, food and feed biotechnology and to get acquainted with novel or alternative strategies to seek an answer to such issues.

Scientific Programme

For

International Conference on Advances in Biosciences and Biotechnology (January 31st - February 2nd 2019)

Programme

Day 1, January 31st, 2019

08:30 AM -09:30 AM	**Spot Registration and Distribution of Conference Kit (*In front of Auditorium*)**
Inaugural Session	
09:30 AM -10:30 AM	**Inauguration and Welcome Note**
10:30 AM - 11:00 AM	**High Tea**
Session 1: *Bioresources & Biodiversity*	
11:00 AM - 11:30 AM	**Keynote Address by Emeritus Professor Michael Goodfellow, School of Biology, Ridley Building, Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom**
11:30 AM - 12:00 PM	**Keynote Address by Dr. Banwari Lal, Senior Director, Environmental & Industrial Biotechnology, The Energy and Resources Institute (TERI), Delhi.**
12:00 PM - 1:00 PM	**Oral presentations & Poster Evaluation**
1:00 PM - 2:00 PM	**Lunch**
Session 2: *Agriculture Biotechnology & Bioentrepreneurship*	
2:00 PM - 2:30 PM	**Keynote Address by Prof. K.C. Bansal, Area Convenor, Nano Biotechnology Centre, The Energy and Resources Institute (TERI), Delhi**
2:30 PM – 3:00 PM	**Keynote Address by Prof. Subhash Chand, Emeritus Professor, DBEB, IIT Delhi**
3:00 PM – 3:30 PM	**High tea**
3:30 PM – 4:00 PM	**Keynote Address by Dr. M.S. Saharan, Principal Scientist, Indian Agriculture Research Institute (IARI), Delhi**
4:00 PM – 5:00 PM	**Oral presentations & Poster Evaluation**
6:00 PM – 8:00 PM	**Cultural Evening**
8:00 PM - 9:30 PM	**Gala Dinner**

Programme

Day 2, February 1st, 2019

Session 3: ***Food and Environmental Biotechnology***	
10:00 AM - 10:30 AM	**Keynote Address by Sobhy El Sohaimy, Professor of Food Biochemistry, Head of Department of Food Technology, City of Scientific Research and Technology Applications (SARTA-City), National Representative of ISEKI-Food Associstion (IFA), Egypt**
10:30 AM - 11:00 AM	**Tea/Coffee Break**
11:00 AM - 11:30 PM	**Keynote Address by Dr. Sarita Ahlawat, BIRAC BIG Innovator, Head-Living Science Group**
11:30 AM - 1:00 PM	**Oral presentation & Poster Evaluation**
1:00 PM – 2:00 PM	**Lunch**
Session 4: ***Medical Biotechnology***	
2:00 PM – 2:30 PM	**Keynote Address by Dr. J Venkatesh Pratap, Principal Scientist, Central Drug Research Institute (CDRI), Lucknow**
2:30 PM – 3:00 PM	**Prof. Indranil Biswas, Department of Microbiology, Molecular Genetics & Immunology, University of Kansas Medical Center, Kansas City, USA**
3:00 PM - 3:30 PM	**High tea**
3:30 PM - 4:00 PM	**Keynote Address by Dr. Javed Ali, Professor, Dept. of Pharmaceutics, Jamia Hamdard, New Delhi**
4:00 PM - 5:00 PM	**Oral presentation & Poster Evaluation**

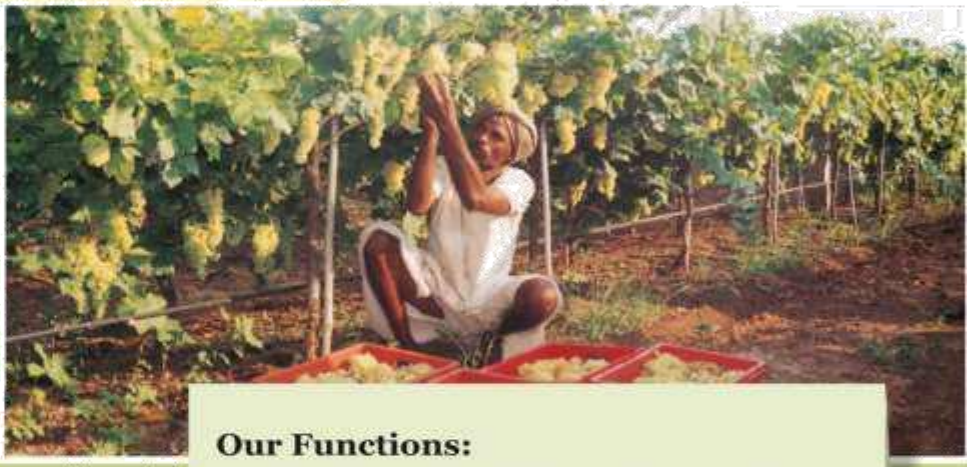
Programme

Day 3, February 2st, 2019

Session 5: *Microbial Biotechnology*	
10:00 AM – 10:30 AM	**Keynote Address by Dr. Yogesh Shouche, Director, National Centre for Microbial Resources, Pune**
10:30 AM – 11:00 AM	**High Tea**
11:00 AM – 11:30 AM	**Keynote Address by Prof. A.K. Saxena, Director, ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Kusmaur, Mau, Uttar Pradesh**
11:30 AM – 12:00 PM	**Valedictory Session and Certificate Distribution**
12:00 PM – 12:30 AM	**Vote of Thanks & Feedback session**
12:30 PM onwards	**Lunch**

National Bank for Agriculture and Rural Development

NABARD



Our Mission: Promotion of sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institution development and other innovative initiatives.

- Research and Development on matters of importance pertaining to agriculture, agricultural operations and rural development including the provision of training and research facilities.
- Consultancy services related to Agriculture & Rural Development through subsidiary (NABCONS).

Our Functions:

- Provide Credit/Refinance for production credit and investment credit to eligible banks and financing institutions.
- Development functions undertaken through Farm Sector Promotion Fund (FSPF), Financial Inclusion Fund (FIF), Watershed Development Fund (WDF), Tribal Development Fund (TDF), Rural Infrastructure Development Fund (RIDF), etc.
- Supervisory functions in respect of Cooperative Banks and Regional Rural Banks.

Head Office Plot C-24, 'G' Block Bandra Kurla Complex, Bandra (East) Mumbai - 400 051

Messages

MANOJ GAUR
Executive Chairman

JAIPRAKASH ASSOCIATES LIMITED

January 10, 2019

MESSAGE

I am happy to know that the **Department of Biotechnology, Jaypee Institute of Information Technology, Noida,** is organizing the **'International Conference of Advances in Biosciences and Biotechnology'** from 31st January – 2nd February 2019, with its theme as ***'Bioresources and Biodiversity'***.

Bioresources constitute a valuable information base and its loss is becoming a matter of serious global concern since valuable scientific knowledge can be lost. India, being one of the hotspots of biodiversity, is equally concerned. There is a strong need to develop linkages between budding researchers, scientists and entrepreneurs using biotechnological tools.

This conference will provide an excellent opportunity to all participants to share available knowledge base in various areas of biotechnology. Discussions and deliberations during the conference will encourage students and researchers and motivate them to develop interest in commercialization of bioproducts.

I am sure that the conference will be a great success.

With best wishes,

Manoj Gaur

JAYPEE GROUP

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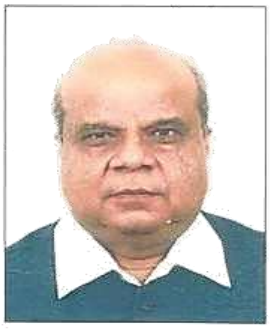
Jaypee Institute of Information Technology
(Declared Deemed to be University u/s 3 of the UGC Act)

January 10, 2019

Prof. (Dr.) S. C. Saxena
Vice-Chancellor



MESSAGE

Jaypee Institute of Information Technology, Noida has gained credibility and reputation for high academic standards. The university aims to develop engineers with sound technical skills and ability to fit into the global industrial environment effortlessly. Our visionary founder, Shri Jaiprakash Gaur's dream of using technology for economic growth resulted in establishment of higher technical institutes with excellent educational and infrastructure facilities, offering technical undergraduate, post-graduate and doctoral programmes.

It gives me great pleasure to know that the Department of Biotechnology, Jaypee Institute of Information Technology, Noida is organizing the '**International Conference of Advances in Biosciences and Biotechnology**' from 31st January – 2nd February 2019, with its theme as '***Bioresources and Biodiversity***'. Since its inception, the department has been actively engaged in research in diverse fields of biotechnology and guiding students in their academics as well as future career path.

Recent events related to unsustainable exploitation of biodiversity resources has necessitated creation of platforms for effective exchange of knowledge and know-how using biotechnological tools for management of natural resources for human welfare. I am certain that the various sessions during the conference will effectively bring out new ideas and solutions for the pressing problems related to the conference themes.

I welcome all delegates to this conference and hope the theme will benefit the scientific fraternity and students alike. I convey my best wishes to the organizers, and wish the event a grand success.

With my very best wishes,

S.C. Saxena

January 15th, 2019

Message from the Organizers

It is a great pleasure to welcome you all to the '**International Conference of Advances in Biosciences and Biotechnology**' from 31st January – 2nd February 2019 at Jaypee Institute of Information Technology, NOIDA. The theme of the conference focuses on '*Bioresources and Biodiversity*', and the critical role of biotechnology in the current scenario.

Biodiversity contributes to genetic diversity and its conservation is important for economic and healthcare reasons. The rush for natural products development and bioprospection has emphasized the importance of effective documentation leading to global intellectual property protection. Agri and environmental biotechnology address similar concerns and, in recent times, has played a significant role in healthcare augmentations and environment protection via agriculture and industry. Our conference aims to create awareness about the harnessing of bioresources for human welfare. There are highly informative keynote lectures from renowned speakers as well as oral and poster sessions for young researchers.

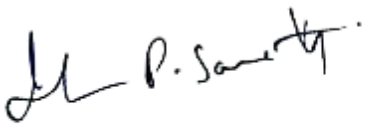
We thank Prof. S.C. Saxena, Hon'ble Vice-Chancellor, for his continued guidance and motivation which have helped to make this conference a success. Without his support, the event would not have been a success.

We thank all the speakers and delegates who have kindly responded to our invitation and shown keen interest. Our Advisory Committee members have guided us throughout and we acknowledge the same. We give our heartfelt thanks to our enthusiastic organizing team, comprising our faculty members and students whose efforts in the meticulous planning and execution have contributed in making this event possible. The support received from our publishing partners and sponsors is gratefully acknowledged.

We sincerely believe that you will benefit from participating in the conference, meeting leading scientists in the field and interacting with budding scientists. We apologize for any shortcomings and look forward to your continued support for this and subsequent events in the coming years.

Thank you all once again.

Dr. Pammi Gauba
Chairperson



Dr. Indira P. Sarethy
Organizing Secretary

Dr. Ashwani Mathur
Organizing Secretary

Keynote Speakers' Abstracts

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DRUGS FROM AN OLD DESERT

MICHAEL GOODFELLOW[1]

[1]School of Natural and Environmental Sciences, Newcastle University Newcastle upon Tyne, UK. Email: m.goodfellow@ncl.ac.uk

Abstract: Gifted actinobacteria are being sought from extreme ecosystems on the premise that the conditions therein will select for populations of previously unknown actinobacteria which will be the source of new drugs with novel modes of action. The focus of this presentation is on the significance of pioneering studies on actinobacterial diversity in the Atacama Desert, northeast Chile, the oldest and continually driest non-polar temperate desert on Earth, where, until recently, the abiotic conditions were seen to be so severe that no form of life could be supported. It is now clear that the Atacama is teeming with microbial life. Atacama habitats contain small, but taxonomically diverse communities of filamentous actinobacteria, most are novel and bioactive with some synthesising new antibiotics of clinical interest. Members of the novel species, *Streptomyces leeuwenhoekii*, for instance, produce the chaxamycins, which show antibacterial and antitumour activity and chaxapeptin, a novel anticancer compound. Similarly, *Lentzeachajnantorensis* synthesises new diene glycosides, the lentzeosides, which inhibit HIV-1 integrase activity. Culture- independent studies show that Atacama soils encompass an astonishing degree of actinobacterial "dark matter"; rank-abundance analyses show them to be highly diverse habitats composed of rare and unknown taxa that have yet to be cultivated. The implications of these studies on future bioprospecting campaigns will be considered.

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A CASE STUDY ON RESTORATION OF OIL SPILLS SITE IN KUWAIT OIL FIELD, KUWAIT

BANWARI LAL[1*], VEERANNA A CHANNASHETTAR[1], MUKESH YADAV[1]

[1]Bioremediation Technology, TERI, Lodhi Road, New Delhi, India.: Email: banwaril@teri.res.in

Abstract: The petroleum industry effluents and oily sludge and oil spills cause a serious threat to the environment as their constituent compounds have toxic, mutagenic and carcinogenic properties. With the stringent regulatory norms and environmental obligations, the petroleum corporates have taken initiatives for proper management and treatment of these hazardous wastes. Different approaches have been tried since early times and some of them are Land filling, Incineration, Air Spurging, Natural Remediation (like evaporation of VOCs, auto oxidation, and photo oxidation, etc.), Land farming, Surfactants, and Other conventional methods like chemical dissociation, dumping in injection wells, surface impoundment, waste piles, underground injection wells, etc. However the common drawback in all those conventional methods are that they are not the permanent solution for the environmental pollution and sometimes they are not cost effective. Therefore, environment friendly technologies are increasingly in demand today for oily sludge management. After extensive research an indigenous bacterial consortium was developed by assembles of selected bacteria species, isolated from oil contaminated sites of Kuwait Oil Company (KOC), Kuwait, which could degrade different fraction of total petroleum hydrocarbon. This bacterial consortium is designated as KT-Oilzapper. Biodegradation is the most ecofriendly and economically viable among all the available methods of sludge management. As a case study, a pilot demonstration project on bioremediation was carried out at an area of 70 m x 70 m of oil contaminated site, both at surface and subsurface level (upto 1.5 m depth), near Gathering Centre 2 (GC-2), Burgan, South Kuwait Oil Field of KOC, Kuwait, using KT-Oilzapper. The surface level of the site was divided in three blocks as Block A, B & C and the subsurface level of 1m x 1m area was considered as Block D. One control plot of 10 m x 10 m area was also selected for the demonstration project where KT- Oilzapper was not applied. At the experimental site the total petroleum hydrocarbon (TPH) in the oil contaminated soil was biodegraded by 98.04%, 98.42%, 98.00% and 99.29 % in Block A, B, C and D respectively in 60 days time. After bioremediation, the TPH content in all the experimental blocks were less than 1000 ppm. Whereas, at the control plot the degradation of TPH was only 0.68% in the same time period. The soil after bioremediation was tested in laboratory in Kuwait and found to be equivalent to agricultural soil.

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BIOTECHNOLOGICAL APPROACHES FOR SUSTAINABLE AGRICULTURE, FOOD AND NUTRITIONAL SECURITY

K C BANSAL[1]

[1]**Former Director, National Bureau of Plant Genetic Resources (ICAR), Pusa, New Delhi, and Senior Fellow, and Area Convener, TDNBC, TERI, New Delhi**

Abstract: Green revolution brought self-sufficiency through the use of plant genetic resources, particularly wheat and rice and traditional breeding tools. Although traditional plant breeding has been largely instrumental in developing improved crop varieties in the past, the contemporary new plant breeding technologies that include targeted genetic engineering and genome editing tools hold a great promise today in introgressing features like climate resilience and enhanced nutrition in crop varieties and hybrids. Thus, it is of paramount importance that we focus our attention on utilizing the plant genetic resources for isolating novel genes and genomic resources from Indian landraces for sustainable agriculture keeping in view the UN's Sustainable Developmental Goals, particularly achieving zero hunger. Further, translational research with biotechnological applications for converting the existing crop genomics knowledge and datasets to a product is highly desired for the well-being of farmers, consumers and society at large.

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BIO-ENTREPRENEURSHIP – COMMERCIALIZATION OF BIOTECHNOLOGY (SOME COMMERCIAL & TECHNICAL ASPECTS)

SUBHASH CHAND[1]

[1]**Biochemical Engineering & Biotechnology, Indian Institute of Technology Delhi New Delhi-110 016**

Abstract: In the widest context, biotechnology acquires credibility only when it is able to create profitable products and efficient processes. Commercialization of biotechnology through entrepreneurship, therefore, offers an important career opportunity to appropriately trained biotechnology graduates. Some of the commercial and financial factors play an important role in influencing the success or failure in a new venture. In order to produce a new product, process or service starting from a new idea, it requires to carry out market evaluation, technical research, optimization, scale up, application studies and financial appraisal before one can establish manufacturing, sales and distribution facility. Characteristic features of the identified product / process route, resources / facilitating mechanisms for the commercial success and principles of the bioprocess economics should be critically understood for achieving success. Also, financial appraisal of the project is a vitally important aspect in the commercialization process. Considerable benefits can be obtained by analyzing the potential developments of the biotechnology R&D in the above perspectives, minimizing commercial failures. In summary, the presentation would aim at explaining, why it takes so long to convert a technical 'break-through' in to a commercial success.

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WHEAT BIOTIC STRESSES IN INDIA AND THEIR MANAGEMENT UNDER CHANGING CLIMATIC SCENARIO

M S SAHARAN[1]

[1] Principal Scientist, Plant Pathology, Division of Plant Pathology, ICAR-IARI, New Delhi-110012. Email: mssaharan7@yahoo.co.in

Abstract: Wheat (Triticum aestivum L.), is second most important staple food crop of the world accounts nearly 30 per cent global cereal production covering an area of 220 million hectares. Wheat production in India has increased many folds from 6.4 mt in 1950 to 99.70 mt during 2017-18 with productivity to the tune of 3.37 t/ha. The achievements in wheat production in India have been perhaps the most important and unparallel in the history of developing world. Since the initiation of the 'Green Revolution' in the mid sixties, India achieved remarkable increase in production and productivity of wheat. The most serious constraints to wheat production are biotic stresses like rusts, blights, powdery mildew, bunts and smuts. The concerted efforts of wheat surveillance has contributed significantly in keeping vigil on new pathogens and devising strategy for developing new resistant varieties ahead the pathogen can cause loss to the crop. However new rust pathotypes result in breaking of resistance of popular wheat varieties. Even after several decades of rust breeding, rusts are very important in many parts of the world. Important reasons are rapid evolution in pathogen population and change in environmental conditions. In addition to rusts, spot blotch of wheat caused by Bipolaris sorokiniana affects approximately 9 mha area of the North-Eastern Plains Zone (NEPZ) of India. Another disease Karnal bunt important from trade point of view has been mostly severe in the north western plains zone (NWPZ) which provides wheat to the national buffer stock. The disease has not been recorded in Maharashtra, Gujarat, Orissa, Assam, Meghalaya, Karnataka, Andhra Pradesh, Tamil Nadu and Kerala. Another disease, Fusarium head blight or head scab of wheat caused by Fusarium spp. is a devastating disease that cause significant yield and quality losses in humid and sub humid regions of the world. Currently head scab is of minor importance to India but due to global climate change, there are chances of having more rainy days and high precipitation during the time of anthesis which will make wheat vulnerable to head scab. Details of research work done on pathogenic / genetic variability, identification of multiple resistance sources and on different aspects of host-pathogen interaction will be presented.

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QUINOA-BASED FOOD FOR ADDRESSING MALNUTRITION

SOBHY EL SOHAIMY

Professor and Head of Department of Food Technology, City of Scientific Research and Technology Applications (SARTA-City), National Representative of ISEKI-Food Associstion (IFA), Egypt

Quinoa is an edible seed that has become increasingly popular among health- conscious people. It's loaded with many important nutrients. It has been eaten for thousands of years in South America. Quinoa is naturally gluten-free. Using it instead of typical gluten-free ingredients can increase the antioxidant and nutrient value of your diet when you're avoiding gluten. It also contains all the essential amino acids that you need, making it an excellent protein source for vegetarians and vegans. The present project aimed to utilize quinoa seeds to develop some bakery products with high nutritive value. Quinoa flour consider a good source of protein in term of quantity and quality. The amino acids composition of quinoa protein isolate showed that quinoa protein had reasonable concentrations of essential amino acids specially lysine and suffer amino acids which is very low in most of grains. Quinoa flour has the most balanced and perfect minerals content such as potassium, sodium, magnesium, calcium and iron. Quinoa flour is a good source of vitamins such as Vitamin C and B complex. Quinoa flour presented a good amount of antioxidant such as phenolic compounds and flavonoids. In the present study we are succeed to developed a novel, highly nutritive bakery products (baladi bread, biscuits, muffin, pan bread up to supplemented with up to 30 % of quinoa flour without any negative effect on rheological and sensorial properties). The outcome of this project may open promising prospect for prevention and/or treatment of malnutrition which is accumulative problem in Egyptian community especially in rural areas.

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LIFE IN START-UP WORLD: DEVELOPING NEW TECHNOLOGIES AND A SCIENCE COMMUNICATION PLATFORM

SARITA AHLAWAT

BIRAC BIG INNOVATOR, HEAD-LIVING SCIENCE GROUP, TBIU, IIT-DELHI

Abstract: Life in a start-up involves several challenges such as working with a new technology, fund generation, dealing with people from multiple disciplines, taking care of regulatory requirements, getting things manufactured and above all suspicious mind set of people in India towards a private company. Journey through all these challenges is sometimes overwhelming but exciting at the same time. We are pursuing three diverse projects. First, our group is developing 3D imaging based methods that can have applications in diagnosis, basic research laboratories or material science using a novel microscope invented at IIT-Delhi. The primary advantage of 3D imaging (Digital Holographic Microscopy) based method is that it is quantitative in nature, provides extra dimension of information and amenable to automation. Currently, we are focusing on building smart screening and diagnosis tool for cervical cancer and blood cell analysis. We have shown with our method cervical cells can easily be characterized, and classified based on the cell morphology. Second project, we are developing a process by which using the local network of air pollution monitoring devices the exposure levels of an individual can be calculated and for avoiding the risk of health diseases. However, in this the data available in form of AQI from the few sample locations doesn't help to know the individual exposures. Pollution is never good but at least one can take efforts to reduce the exposure. There are multiple components of indoor and outdoor air pollution where one should pay attention to such as levels of Particulate Matter (PM) of size 1.0, 2.5 or 10um, CO2, TVOC, SOX, NOX etc. The long term effects of high level pollution exposure are not even fully know and pose future health hazards. We are building a personalized air pollution dosage monitor which can calculate daily exposure so that people can adjust their day-to-day activities in order to minimize overall pollution exposure. Our compact (fits in your pocket) low cost system build in house can give the user an exact measure of pollutants around them and can be synced with the mobile phone for ease of use. In addition, I have also been developing a science communication platform- Living Science- for students to interact with the prominent scientists in India. All the interaction sessions are video recorded and shared on webpage (***www.livingscience.in***), YouTube (**https://goo.gl/4e8Uam**) and Facebook page (**https://goo.gl/puWnae**). In this short journey our team has been able to reach out to more than 100,000 students across India.

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RV3272 IS A NOVEL FAMILY III COA TRANSFERASE INVOLVED IN HOST-PATHOGEN INTERACTION

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Abstract: *Mycobacterium tuberculosis,* the causative agent of tuberculosis is one of the most important pathogens affecting healthcare systems worldwide, with an estimated one third of the population harbouring the latent infection. The availability of complete genome sequence of Mtb has provided an important tool to understand mycobacterial biology. Nearly half the sequences therein are annotated as proteins of unknown function or hypothetical proteins that could potentially be significant. Preliminary analysis of Rv3272, a conserved hypothetical protein shows that it could be involved in virulence, pathogenicity & mycobacterial dormancy. Sequence comparison studies indicate that this belongs to the CoA transferase family and the elucidated crystal structures demonstrate the characteristic fold and domain motion observed in this class of proteins. Structural analysis suggested potential ligands that were further experimentally validated using Isothermal Titration Calorimetry studies. The ectopic expression of Rv3272 in *M. smegmatis* led to significant alteration on the cell surface and under *in vitro* conditions, protects mycobacteria from oxidative, acidic and antibiotic stress. Taken together, these results argue for a significant role of Rv3272 in host-pathogen interaction.

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NANOPHARMACEUTICALS: CHALLENGES AND OPORTUNITIES FOR PHYTOTHERAPEUTICS

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Abstract: Herbal medicines have been widely used all over the world since ancient times and have been recognized by physicians and patients for their better therapeutic value as they have fewer adverse effects as compared with modern medicines. Though they present many advantages over modern medicine, lack of scientific approach, inadequate standardization and patient compliance limit them from being used extensively but the recent technological advancement in nanotechnology has unlocked new avenues for research and development in the field of phyto-medicine. Phytotherapeutics now has a scientific approach in delivering the components in a sustained manner to increase patient compliance and avoid repeated administration which has been achieved by designing novel drug delivery systems (NDDSs) for herbal constituents. NDDSs not only reduce the repeated administration to overcome non-compliance but also help to increase the therapeutic value by reducing toxicity and increasing the bioavailability. Polymeric nanoparticles/nanocapsules, liposomes, pro-liposomes, solid lipid nanoparticles, nanoemulsions/microemulsions, etc. are few examples of nanopharmaceuticals (NPhs) that have been successfully developed or are under research for efficient delivery of herbal actives and extracts. The presentation will cover the different aspects of application of NPhs for herbal actives and extracts. Prototype examples of various NDDS will be also discussed.

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TRADITIONAL KNOWLEDGE OF MACROFUNGI FROM FOREST TO TABLE: THE CHALLENGES

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Abstract: Mushrooms, the macrofungi belonging to the Sixth Kingdom, packed with a wide array of bioactive functional components, are excellent antioxidants and anti-inflammatory agents. Currently mushrooms are being actively explored as therapeutics and / or chemopreventive agents for human wellness and to mitigate / manage human ailments. Of the approximately 2000 species of edible and / or medicinal mushrooms known, less than 10 species are deemed medicinal while another 25 are edible and commercially available. Search for new edible and medicinal mushrooms as therapeutics and / or chemopreventive agents, can leap start by harnessing traditional knowledge from the folks who live in the villages, fringes of forests and in the forests. The traditional knowledge is handed down by 'word of mouth' and today in many communities only the elders have the knowledge. This coupled with the rarity and seasonal nature of many of the mushroom/s in the wild, collection and identification of the mushroom/s is a challenge. Further, taming and cultivating the target mushroom/s to obtain sufficient materials for assessment is a challenge, too. In this presentation we will share our experiences and challenges we faced when validating the traditional claims for both culinary and medicinal mushrooms including *Pleurotus giganteus, Ganoderma neo-japonicum, Lignosus rhinocerotis, Amauderma rugosum*.

Abstracts for Oral/Poster Presentations

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POMEGRANATE BACTERIAL BLIGHT: ABUTILON INDICUM, PROSOPISJULIFLORA AND ACACIA ARABICAAS ANTIBACTERIAL AGENTS FOR XANTHOMONAS AXONOPODISPV. PUNICAE

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Abstract: Xanthomonas axonopodispv. Punicae causes Bacterial blight disease in Pomegranate. Complete range of symptoms of bacterial blight caused by anthomonasaxonopodispv.Punicaeon various pomegranate plant parts expect roots. The present investigation was initiated to find a suitable alternative to synthetic antibiotics for the management of plant diseases caused by bacteria. The study was aimed to use wild plant species viz., Abutilon indicum, Prosopis juliflora and Acacia arabicaas Antibacterial agent against Xanthomonas axonopodispv. Punicae. Aqueous extracts of Abutilon indicum, Prosopisjuliflora and Acacia arabica plants has Antibacterial activity against Xanthomonas axonopodispv. Punicae. The antibacterial activity was tested by well diffusion assay, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). The maximum activity recorded in P. juliflora (MIC = 1.03 mg ml-1 and MBC = 0.15 mg ml-1) and A. arabica(MIC = 1.00372 mg ml-1 and MBC = 2.58 mg ml-1) against X. axonopodispv. Punicae, while the lowest activity was recorded by A.indicum (MIC = 0.619 mg ml-1 and MBC = 0.923 mg ml-1). Highest ZOI was shown by P.juliflora while lowest ZOI was shown by A.indicumThe results infer that the extracts of Prosopis julifloraand Acacia arabica are highly sensitive against the Xanthomonas axonopodispv. Punicae. Plant extracts resulted in antibacterialactivity is potential to use in the management of plant diseases as an alternative to chemical antibiotics.Further phytochemical analysis is required to identify the bioactive compounds responsible forantibacterial activity.

Keywords: Prosopis juliflora, Aqueous extracts, Acacia Arabica, Synthetic antibiotics.

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PRODUCTION OF PLUMBAGIN FROM SUSPENSION CULTURE OF PLUMBAGO ZEYLANICA

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Abstract: Plumbagozeylanica, pharmaceutically important medicinal plant contains wide range ofphytocompounds. It is widely utilized for the treatments of diseases such as skin diseases, diarrhoea, piles, rheumatism and leprosy. Secondary metabolites present in this plant include steroids, glycosides, saponins, flavonoids, triterpenoids, alkaloids, coumarins, tannins, phenolic compounds, carbohydrates, fats, proteins, and naphthoquinone. Plumbagin is the main secondary metabolite which is mostly found in the roots of this plant. In the present study callus culture was initiated from P. zeylanica leaf explants by varying the concentrations of different auxins, MS media containing 1.0 mg/l NAA show highest amount of friable callus growth. Optimization of culture media (MS, B5 and Nitsch) for maximum callus growth was done and it was found that MS media provides maximum growth. MS liquid media containing 1 mg/l NAA was utilized for establishment of cell suspension culture. Cell suspension cultures were treated with different concentrations of yeast extract. Maximum amount of plumbagin production was observed in cell suspension culture treated with 150 mg/l yeast extract and enhancement was up to 3 times as compared to the control culture. Elicitors in cell suspension cultures induce defence mechanism which leads to enhanced production of secondary metabolite. If the stressed condition continues then it will eventually leads to the programmed cell death and loss of culture viability. Results showed that utilization of elicitors is a potential approach for plumbagin enhancement and suggests that establishment of higher yielding P. zeylanica cell suspension culture could be possible by optimization of culture condition.

Keyword: Callus, cell suspension culture, plumbagin, elicitor

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BIOPROSPECTION OF INDUSTRIALLY IMPORTANT ENZYMES FROM THERMOPHILIC BACTERIA ISOLATED FROM HOT SPRINGS OF INDIAN HIMALAYAN REGION

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Abstract: A number of hot springs, located in Indian Himalayan region, have been studied for their thermophilic diversity and bioprospection. Enzymes from thermophilic bacteria have received great attention for their potential applications in various industrial purposes. In the present study 10 thermophilicbacterialcultures, originally isolated from Soldhar(temperature 95°C, latitude 39° 29′ 25″, longitude 79° 39′ 29″; altitude 1,900 m amsl) and Ringigad(latitude 30° 33′14″, longitude 79° 40′ 0.06″; altitude 1,850 m amsl) hot springsofUttarakhand Himalaya have been investigated for the production of five enzymes namely, amylase, lipase, xylanase, protease and cellulase. The maximum amylase (1217.86 U/ml), lipase(22.59U/ml), xylanase(98.07U/ml), protease(16.66U/ml)and cellulose(108.68U/ml)were produced by bacterial isolates GBPI_25 at 45°C & 5 pH, GBPI 3 at 65°C & 9 pH, GBPI_25 at45°C & 9 pH, GBPI_35at 55°C & 9 pH, and GBPI 4 at 45°C & 5 pH, respectively. Crude enzyme preparations showed broad temperature and pH range between 10-100 °C and 3-11 pH, respectively, with different temperature and pH optima.Maximum amylase, xylanase and cellulase activity was recorded at 50 °C while lipase and protease activity was recorded at 40 and 60°C, respectively. The recorded temperature ranges for cellulase and protease activity from 10-100°C, amylase and xylanase 10-90°C, and lipase 10 - 80°C.Similarly, broad pH ranges for amylase and lipase activity was recorded from 4-11, for xylanase from 3-9, and for protease and cellulase from 3-10. All the enzymes showed maximum stability at 40°C and pH 5, except cellulase which showed higher stability at40°C and neutral pH.

Keywords: Indian Himalaya, Hot springs, Thermophiles, Enzyme stability, Enzyme activity

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SYNTHESIS OF IRON NANOPARTICLES SYNTHESIS USING PLUMBAGO ZEYLANICA

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Abstract: Nanotechnology deals with the production, manipulation and utilization of materials that are ranges in nanometre size. Nanoparticles research is an important aspect due to its innumerable applications in the field of bio-medical, sensors, antimicrobials, catalysts, electronics, optical fibers, agricultural, bio-labelling and in other areas such as cosmetics, drugs delivery, semi-conductors and automobiles etc. Iron nanoparticles synthesis using plants has great potential as it is cost effective, environmental friendly, reproducible and energy saving as compared to the physical and chemical methods. They are highly reactive because of their large surface area. They are widely used in medical and laboratory applications and have also been studied for remediation of industrial sites contaminated with chlorinated organic compounds. In the present study influence of various factors on iron nanoparticles synthesis such as time, temperature, iron salt concentration and aqueous extract concentration has been studied. Ultraviolet (UV)-visible spectroscopy was used for the characterization of synthesized nanoparticles. UV/Vis absorption showed a characteristic absorption peak of iron oxide nanoparticles in the range of 250-400 nm. SEM was used to identify the shape of the particles i.e. cubic in shape. Further treatment of waste water collected from nearby area was done using synthesised iron oxide nanoparticles.

Keywords: Nanoparticles, Plumbago zeylanica, Remediation

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ADVENTITIOUS ROOT CULTURE FOR SECONDARY METABOLITE PRODUCTION FROM MEDICINAL PLANTS: AREVIEW

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Abstract: Plants have been exploited for their medicinal properties since time immemorial. The basis for this property lies in the production of secondary metabolites from plants. The secondary metabolite are not needed by plant for performing basic life processes but are produced under the encumbrance of abiotic stresses as a defensive strategy. Plant culturing has emerged as a successful method for large scale production of these compounds. Plant cell, tissue and organ culture is an effective method to study the biological significance of bioactive metabolites under in vitro conditions, as well as for producing natural products for bioprocessing applications. Tissue culture methods provide continuous, reliable, and renewable source of valuable plant secondary metabolites. Different tissue culture methods for secondary metabolite production include, cell suspension culture, hairy root cultures and adventitious root cultures. Due to certain limitations of cell suspension culture, adventitious root culture and hairy root culture have gained popularity over in recent times for the production of secondary metabolites of pharmaceutical and nutraceutical importance. Adventitious roots have been successfully induced in various medicinal plant species and cultured for the production of secondary metabolites. Establishing an adventitious root suspension culture system would increase the large-scale multiplication, strain improvement and species conservation but optimization and scale-up is required to increase root biomass and secondary metabolites In the present review we attempt to highlight the recent advances in the use of adventitious root cultures for the production of secondary metabolites in medicinal plants. Further studies for increasing the efficiency of bioreactors opens up new horizons for productionofsecondarymetabolitesattheindustriallevel.

Keywords: Pharmaceutical, Nutraceutical, Secondary metabolites

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FUNCTIONAL PROFILING OF THE TANNERY WASTE METAGENOME

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Abstract: Indian tannery industry is the third major leather producer in the world. Tannery industry waste is considered as a major source of environmental pollution in the form of skin trimmings, keratin waste, chrome shavings and fleshing waste. In the present study, two tannery waste metagenomes representing Jajmau (JJK) and Unnao (UNK) tannery waste dumping sites were sequenced using Illumina HiSeq 2500 platform. Sequence data were analyzed using KEGG and SEED tools of MEGAN6 to understand the functional profile of the two metagenomes anticipating the presence of some microbial species that may be involved in the degradation of the tannery waste. The KEGG annotation demonstrated that genes involved in metabolism (35.30% and 36.36%), genetic information processing (10.21% and 10.54%) and environment information processing (8.86% and 8.48%) were in abundance in both the metagenomes. The SEED annotation data further exhibited that the most abundant functional categories included carbohydrate metabolism (9.37% and 9.62%); cofactors, vitamins, prosthetic groups and pigments (8.86% and 8.79%); amino acids and derivatives (8.30% and 8.51%); protein metabolism (7.24% and 7.26%), and functionally grouped genes with unknown function (7.11% and 7.26%) in JJK and UNK sample, respectively. STAMP tool was used to assess significant differences between different KEGG and SEED levels categories present in the two samples. In silico mining of KEGG and SEED classifications revealed the abundance of serine (65% and 63%) and metallo-protease (23% and 25%) encoding genes in the JJK and UNK sample, respectively. Further, structural and functional analysis of selected protease encoding genes is underway for the identification of novel enzymes contributing towards degradation of tannery waste.

Keywords: Tannery industry, solid waste, KEGG, SEED, proteases

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CHARACTERIZATION OF RHIZOMICROBIOME OF SOIL FROM DROUGHT CONDITIONS

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Abstract: Drought is a major abiotic stress which affects the growth and yield / productivity of crops all over the world. It is predicted that world population will be increased upto 8 billion by 2030 which will create the problem of food security by challenging the agricultural sector. Millions of microbes inhabit plant root system forming a complex ecological community that influences plant growth and productivity through its metabolic activities and plant interactions. Changes in the structure of plant-associated bacterial communities in the root zone towards the selection of assemblages that are adapted to abiotic stress, improve the resistance against stressors to promote health and drought tolerance of plants. The rhizosphere microflora include bacteria, fungi, nematodes, protozoa, algae and microarthrops. Of the soil microbes, 98% cannot be cultured. Their identification, characterization and the description of their role are therefore particularly difficult. Nucleic acid based techniques including analysis of DNA and rRNA molecules from soil samples have revealed enormous diversity in the rhizosphere inhabiting microbial flora. The beneficial microbiome associated with roots and plant tissues alleviate plant stress by a variety of mechanisms. Among them, PGPR can directly enhance micronutrient uptake and affect phytohormones homeostasis, or indirectly stimulate the plant immune system against phytopathogens. Microbial communities below the ground level influence the selection on plant traits by mitigating the effects of abiotic stress on plant populations. Such microbes are beneficial for plants to resist growth in drought conditions. Thus, we have isolated and characterized the rhizobacteria from soil samples collected from Rajasthan, Jaisalmer.

Keywords: abiotic stress; rhizobacteria; microbiome.

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CHARACTERIZATION AND IDENTIFICATION OF PHENOL DEGRADING BACTERIA ISOLATED FROM PULP AND PAPER MILL EFFLUENT

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Abstract: In recent years, considerable attention has been paid to the industrial wastes, which are usually discharged on land or into different water bodies. As the industrial development is going on in India, the industrial activities are increasing and creating an adverse impact on agriculture as well as on living organisms. The untreated effluents from paper mills discharged into water bodies, damages the water quality and living organisms. Due to several limitations in the physicochemical treatment methods for treating industrial wastewaters the biological methods are more favourable alternative for the removal of pollutants. In the present study, phenol degrading activity by bacterial isolates collected from industrial effluent has been investigated. The isolated strains were further characterized by morphological, physiological, biochemical and 16S rRNA gene analysis. Isolates as Staphylococcus sp. (MH935803) and Staphylococcus sciuri (MH938044), has been identified in the present study. These two isolates have been identified as novel and potential aerobic bacterial strains that showed maximum survival in the phenol concentration up to 1600 mg/L and 1800 mg/L respectively. Further these strains may be used for biodegradation of phenol containing pulp and paper mill effluent. The study focuses on the characterization of efficient phenol degrading bacteria found in pulp and paper mill effluent which can be considered for use in large scale biorefining. From the environmental and economical point of view naturally exploring of phenol degrading bacteria in the environment is important in the field of biological treatment of industrial effluents. This will help to overcome costly hurdles in biological treatment process.

Keywords: Pulp paper mill effluent, Phenol, Bioremediation, 16S rRNA

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AYURVEDIC FORMULATION FOR THE MANAGEMENT OF DIARRHOEA

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Abstract: Infectious diarrheal disease is the second leading cause of morbidity and mortality among children under 5 years of age in developing countries. Diarrhoea is common in Indian children with an incidence of 334,000 of total 2.3 million annual deaths. Diarrhoeagenic Escherichia coli, specifically enterotoxigenic E. coli (ETEC) is the leading bacterial agent causing diarrhoea in children aged below 5 years. Management of disease involves maintaining hydration, decreasing the frequency of stools passed etc. The antibacterial used can shorten span of disease and can reduce severity of infection. However, a number of cases have been reported where enteric bacteria has developed resistance to antibiotics—including sulfacompounds, penicillin, tetracycline, and trimethoprim/sulfamethoxazole when these drugs are used extensively. In this background antimicrobial activity of Ayurvedic plants which have traditionally been claimed to have antidiarrhoeal properties was tested. The extract of the formulation was made in the solvent of different polarity and was tested against E. coli. In silico study comparing steroidal alkaloids reported to be present in Ayurvedic drug selected for the present study along with drugs which are commercially being used for the treatment of diarrhoea.

Keywords: ETEC; Diarrhoea; children mortality; steroidal alkaloids.

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EFFECT OF GAMMA IRRADIATION ON ANTIOXIDANT LEVEL AND EXPRESSION PATTERN OF TOCOPHEROL PATHWAY GENES IN SOYBEAN

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Abstract: Soybean is one of the most traditionally cultivated legume for its highly nutritional profile and oil content.Soybean is a rich source of proteins, tocopherols, isoflavones which make it a preferable choice for consumers.Ionizing radiation including γ- radiation generates highly reactive oxygen species (ROS) that play an important role in plant growth and development and cell signaling processes, but on the other hand it damage also DNA, lipids and proteins. Soybean has been proven to be a natural crop for reducing or preventing the ill-effects of ROS as it has high content of natural antioxidants mainly tocopherols.Soybean seeds from two varieties of soybean Bragg - high tocopherol (178.91 µg/g) and DS-74 - low tocopherol ((29.72 µg/g) containing varieties were γ-irradiated at 0.5 and 1.0 kGy and were analysed for antioxidant enzyme activities and expression at transcript level, total antioxidant capacity, content of antioxidants (tocopherol and carotenoids) and tocopherol pathway gene expression.The results showed significant increase in SOD (5.34, 7.1, 5.78 µmole/min/mg protein) and POX (68.8, 82.1 and 73.77 µmole tetraguaiacol/min/mg) in control, 0.5 and 1.0kGy irradition in Bragg respectively) and total antioxidant capacities while decrease in CAT activities (4.5, 3.34 and 0.64µmole/min/mg protein at 0, 0.5 and 1.0 kGy respectively in Bragg)was observed. Also the total tocopherol (T-toc) content and its composition showed significantly increased accumulation at 0.5 kGy than 1.0 kGy in both soybean genotypes however no significant difference in carotenoid content after irradiation was observed. Transcript level expression of SOD, CAT, APX and GR showed the higher expression level of SOD and APX in Bragg(3 fold &3.5 fold- respectively) and showed decreased expression level of CAT in the 0.5 kGY irradiated seeds as compared to the seeds irradiated with 1.0 kGy in both the genotypes.The transcript level for tocopherol biosynthesis genes showed higher expression of γ-TMT (2.87 fold- Bragg) and MPBQ-MT (4.1 fold-Bragg) in comparison to other two genes viz. HPT and TC at 0.5 kGy irradiation than control indicating these are the key genes involved in the α-tocopherol synthesis during γ-irradiation. These results suggested that the variation in the ROS production and accumulation upon irradiation may be correlated with the variation in the levels of antioxidant enzyme activity and antioxidants level.

Key words: Tocopherols; Isoflavones; antioxidants

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DEGRADATION OF ORGANIC DYES USING BIOSYNTHESIZED IRON NANOPARTICLES: A GREEN APPROACH

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Abstract: Many industries, such as textile, paper, plastic, leather, cosmetic and food industries release large quantities of organic dyes. These effluents can cause serious ecological damage if they are discharged into the environment without proper treatment. They are not easily degradable and are difficult to remove by traditional wastewater treatment procedures like adsorption, ultrafiltration, chemical and electrochemical methods. Thus, a novel method needs to be devised for efficient degradation of dyes. Due to large surface-to-volume ratios and mass dependent reactivity, metal nanoparticles (NPs) show increased catalytic activity for the degradation of organic dyes. NPs can be synthesized by a variety of physical and chemical methods. However, these methods aren't free from generation of toxic byproducts. Green approach of nanoparticle synthesis by biological elements has many advantages such as environmental benign, less toxic, cost-effective and less time consuming. Currently, plant and plant derived materials are used for synthesis of nanoparticles. Plant-mediated nanoparticle synthesis is better than microbe-mediated nanoparticle synthesis as it eliminates the need for culture maintenance and is more convenient. Iron nanoparticles were successfully synthesized using Bacopa monnieri (commonly known as Brahmi) plant extract. The aqueous extract was added to 1mM ferric chloride (FeCl3) solution and incubated at 75°C for 5 minutes. The color of the reaction medium changed from light brown to brick red; indicating the reduction of Fe3+ ions to iron nanoparticles (FeNPs). The formation of FeNPs was confirmed using UV-Vis spectroscopy. Further synthesized iron nanoparticles were used for the degradation of Methyl Orange and Eosin Yellow dyes.

Keywords: organic dyes; Bacopa monnieri; nanoparticle.

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APPLICATION OF NANO-BASED BIO-COMPOSITE FOR WASTEWATER TREATMENT

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Abstract: Bio-derived wastes are natural, cost-effective, biodegradable, non-toxic materials, and have a good adsorption capacity as compared to other man-made/synthetic composites. Usually the utilized biomaterials are cellulose-rich components that also include chitosan, starch, and chitin as minor ingredients. Since past few decades, bio-composites have gained a tremendous attention for wastewater treatment in several countries being ecofriendly as well as users friendly. Therefore, many scientists are seeking for advanced form of bio-composites that led their journey towards the production of bio-nanocomposites. The term bio-nanocomposites include naturally occurring base material merged with some inorganic moiety with the incorporation of nanoparticles. Past studies suggests that the coating of nanoparticle on agricultural cellulosic waste material induces an enhancing effect in its sorption property, probably due to increased surface area and high reactivity. The present study has also utilized the significant properties of nanoparticles to modify the adsorption phenomena of cellulosic wastes and seeks its relevance in wastewater treatment. The nanoparticles were generated on cellulosic fibers and checked for their stability. The presence of nanoparticles on fiber surface was chemically verified with FTIR analysis. The dye removal capacity of coated cellulosic fibers was studied using UV-vis spectrophotometer. A very good response of synthesized bio-nanocomposite in terms of dye removal capacity was observed. The study is further aimed to improve the synthesized bio-nanocomposite and investigate its utility in other wastewater treatment processes.

Keywords: Bio-nanocomposite; wastewater; nanoparticle; adsorption; cellulosic wastes; FTIR; UV-vis spectrophotometer.

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NITRILASE ACTIVITY OF GORDONIA TERRAE IMPROVED BY WHOLE CELL MUTAGENESIS FOR TRANSFORMATION OF 3-CYANOPYRIDINE TO NICOTINIC ACID

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Abstract: Nitrilases (EC 3.5.5.1) are widely used for the synthesis of industrially important acids from nitriles. Mutants of Gordonia terrae were generated using different chemical mutagens for improving whole cell nitrilase catalyzed transformation of 3-cyanopyridine to nicotinic acid. A total of 237 mutants generated with these mutagens were screened, 34 showed increase in activity and tolerance toward 3-cyanopyridine. Among these, mutant MNNG12 was found to be stable during sub-culturing. MNNG12 (designated as MN12) showed 2.6 times increase in nitrilase activity (1.3 U/mg dcw) and substrate tolerance up to 100 mM of 3-cyanopyridine, when compared with wild types. Response surface methodology (RSM) approach was used to optimize the production of nitrilase of mutant MN12 using Plackett-Burman and central composite design experiments. The maximum nitrilase production was achieved after the incubation of 40 h at 30 °C with isobutyronitrile as an inducer. The optimized medium constituents contained percent g/L) of yeast extract 5.5, peptone 5.0, K2HPO4 5.0, KH2PO4 2.0, MgSO4.7H2O 0.275, FeSO4.7H2O 0.03, CaCl2.2H2O 0.06, NaCl 1.0, glucose 10, pH 8.0 and inducer 0.55%. The enzyme production was further enhanced to 1.27-fold by RSM. The biotransformation with this mutant improved spatial and temporal conversion of 3-cyanopyridine to nicotinic acid.

Keywords: Nitrilase; RSM, 3-cyanopyridine; nicotinic acid; Gordonia terrae mutant MN12

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BIOSENSOR FOR DETECTION OF ENVIRONMENT POLLUTION: A REVIEW

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Abstract: The increasing environmental pollution with particular reference to emerging contaminates, toxic heavy element, and other hazardous agent is a serious concern worldwide. The development of precise instruments can further help in real-time and in-process monitoring of the generation and release of environmental pollution from different industrial sector, moreover, real- time monitoring can also reduce the excessive consumption of several harsh chemicals and reagents with an added advantages of onsite determination into the environment. Biosensors have been widely employed as cost-effective, fast, in situ, real-time analytics techniques for various environmental applications. The requirement of portable, rapid, and smart bio-sensing device with new transduction materials, for detection of different pollutant, requires multidisciplinary experts. On recent progress in biosensor for monitoring of soil pollutions, water and air in real conditions such as potentially toxic elements, pesticides, and small organic molecules including endocrine and toxin disrupting chemical. Biosensors are widely used for environmental monitoring which includes pesticide, organo-phosphorus pesticides, pathogens, potentially toxic elements, toxins, endocrine disrupting chemicals, etc detection. In the present review we discuss the recent updates on biosensors used for environment monitoring.

Keywords: Environmental pollution; Biosensors; pesticides.

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ROLE OF HEME OXYGENASE1 (HO1) IN REGULATION OF SALT TOLERANCE AND LATERAL ROOT DEVELOPMENT IN CICER ARIETINUM L. BY ELEVATING THE EXPRESSION OF AUXIN RESPONSE FACTOR (ARF) GENES AND ENZYMATIC ANTIOXIDANTS

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Abstract: Despite strong research evidences on separate role of Hemeoxygenase on salt tolerance and root development, their integrative regulatory role is still unknown. The plant root is the first organ to encounter salinity stress, but the effect of salinity on Root System Architecture (RSA) remains elusive. Both reduction in main root elongation and redistribution of the root mass between main and lateral roots are likely to play crucial roles in water-extraction efficiency and ion exclusion. In present investigation the role of HO on elevating the expression level of ARF coding genes was examined. At the same time expression of antioxidant enzyme coding genes (CAT, SOD and APX) was also observed. it was found that lateral root growth along with ARF5, ARF6 and ARF 7 and stress-related genes expression profiles were differentially regulated by the application of HO-1 (in particular) showing a synergistic mode. The present findings suggest the combination of compensatory and synergistic modes, linking ARF-dependent Auxin regulation and HO1 expression in the modulation of plant salt tolerance and LR development. This study would be helpful in understanding the role of HO1 with other antioxidants against Salt stress with Lateral root development regulation and for future research in developing Salt Tolerant Varieties.

Keywords: Hemeoxygenase, Root development, Salinity, Root System Architecture, Auxin Response factor (ARF) genes

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COMPARATIVE ANALYSIS OF PHYTOCHEMICALS IN VARIOUS EXTRACTS OF ANTHOCEPHALUS CADAMBA

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Abstract: Anthocephalus cadamba is a medium sized tree, belonging to family Rubiaceae, is found all over India. It is crucially significant as it has the largest number of phytochemicals and secondary metabolites having pharmacological and biological properties. The roots, leaves, fruit and bark of the plant is employed as ethno-drug for various health benefits. The aim of this study was to perform the comparative analysis of phytochemicals in various extracts of A.cadamba. Leaves, fruits and bark of the plant were collected and various organic and aqueous extracts were prepared. Extracts were screened for various phytochemicals qualitatively and quantitatively. Investigations revealed the presence of alkaloids, flavanoids, terpenoids, saponin, glycosides in various parts of the plant. Among various extracts, the total phenolic content and total flavanoids content were significantly higher in fruit extract while total alkaloid content was higher in stems extract. Results confirmed that A.cadamba (fruits, stems, leave) contains important phytochemicals-alkaloids, saponins, glycosides, flavanoids, terpenoids, phenolic content etc. which possess various biological and therapeutic activities.

Keywords: Anthocephalus cadamba, Phytochemicals, Alkaloids, Flavanoids, Phenolics

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PHYTOCHEMICAL ANALYSIS OF TUBERS

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Abstract: Phytoconstituents are the natural bioactive compounds found in plants. Their chemical compounds such as carbohydrates, protein, and lipids are used as food and compounds like glycosides, alkaloids, flavonoids, etc. have therapeutic potential. The present study aims at qualitative screening of the phytochemicals present in the Corm and peel of Amorphophallus paeoniifolius (Jimikand/ Suran), and of Taro root (Colocasia esculenta). The extract was prepared by dissolving dried peel and corm powder in solvents like water, methanol, petroleum ether, and chloroform and concentrated using a rotary vacuum evaporator. The standard qualitative test for each of the peel solvent extracts was performed, which indicated the presence of alkaloids, tannins, phenols, carbohydrates and fat in the extracts The total phenol content and the antioxidant activity was also determined.

Keywords: Amorphophallus, Colocasia, phenol, alkaloids, antioxidant

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BIOLOGICAL ANALYSIS OF YAMUNA RIVER

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Abstract: Water pollution is a very common cause of major health problems across the globe. The most common and widespread health risk associated with drinking water is contamination. The pathogenic agents involved include bacteria, viruses, and protozoa, which may cause diseases that vary in severity from mild gastroenteritis to severe and sometimes fatal diarrhea, dysentery, hepatitis, or typhoid fever, most of them are widely distributed throughout the world. Biological testing methods are progressively often used for determining the surface water quality. In the biological analysis of thewater samples using methods like, most probable number (MPN) method, glutamate starch phenol red agar and hektoen enteric agar, we observed various organisms like coliform bacteria, Aeromonas, Pseudomonas, Salmonella, Shigella, which are harmful for consumption of population to be present in the river water. The biological methods are used for analyzing water quality involves collection, counting and identification of micro-organisms, measurement of metabolic activity rates, and processing and interpretation of biological data. In this paper, we have done a comparative analysis of microbes present in samples collected from different places and their impact on water quality.

Keywords: Biological testing, Contamination, Harmful organism, Water pollution.

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ZERO LIQUID DISCHARGE FOR WASTEWATER MANAGEMENT

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Abstract: With population growth and industrial development, more than 4 billion people face severe water scarcity worldwide as a result potable water production is becoming an increasingly global issue. The global water scarcity is estimated to increase because of climate change and other factors. The membrane-based ZLD technologies have become increasingly popular compared with conventional and thermally driven ZLD processes because of economic factors. There are many factors that can restrict the development and scale–up of membrane-based ZLD processes, such as footprint problems associated with RO. ZLD is commonly used as the wastewater management strategy. It consists of three steps of pretreatment, Preconcentration and evaporation and crystallization with the membrane based Preconcentration step pushing the water recovery to 90-95%. ZLD is a Technological Challenge, and the focus must be on Zero Waste Disposal (ZWD).Brine Concentrations, Evaporation and Crystallization and Disposal still a major issue. Center of attention must be on recovery and reuse of salts. Evaporation is the most powerful tool for removal of dissolved pollutants (salts, organic matter etc). Water Scarcity, Water economics and regulatory pressure are the main drivers of ZLD and will determine financial viability.

Keywords: Brine, Crystallization, Preconcentration, Regulatory, Thermally

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ANTIMICROBIAL EFFECTS OF SOME MEDICINAL PLANTS

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Abstract: Food borne illnesses are still a major problem in the world. Despite new improvements in food production techniques, and control programs, food safety remains as a widespread public health issue. The problem is further aggravated as many bacterial strains develop antibiotic resistance. Research on plant essential oils and phytochemicals, which show potential as natural antimicrobials in food systems, has gained much attention in recent years. Medicinal plants and herbs have been the preferred sources of active molecules which become lead compounds for the manufacture of various pharmaceutical products. Aromatic and medicinal plants produce a wide variety of volatile aliphatic and cyclic hydrocarbons. Their corresponding oxygenated isoprenoid derivatives and analogues form a viscous liquid mixture called essential oils. Several essential oils and their isolates have been found to exhibit strong antibacterial and antifungal activity. These essential oils may be used in the treatment of diseases caused by various harmful microorganisms. A significant number of essential oils and phytochemicals are bioactive against food borne pathogens in vitro, and to a smaller degree, in foods. Further investigation into the efficacy of such natural substances in different food matrices is likely to be a productive area of research. There are various disadvantages as well. On the whole, investigating and collecting relevant information for antimicrobial activity of essential oils and phytochemicals in food can aid in optimizing activity, predicting resistance, and finally deciding the most appropriate natural preservatives to be employed in food conservation systems.

Keywords: Antimicrobial activity, Antibiotic resistance, Essential oil, Food preservation, Medicinal plants

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DNASE I: A CUE FOR IMPROVISING ANTIBIOFILM STRATEGIES FOR BIOFILM MEDIATED INFECTIONS AND MEDICAL DEVICE ASSOCIATED BIOFILMS

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Abstract: Biofilms are consortium of micro-organisms that coexist for mutual benefits in coordinated manner in a self-produced polymeric matrix. Biofilms on animate (wounds, surgical sites, urinary tract, epithelial linings) and in-animate surfaces (prosthetics, valves, catheters, contact lenses, pace makers) accounted for almost 80% of clinical infections reported globally. Biofilm mediated infections include endocarditis, otitis, cystic fibrosis, Urinary tract infection, etc. Causative of such infections include strong biofilm forming microorganisms like Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli, Enterococcus faeciumetc. Preventing biofilms on in-animate surfaces and treating the biofilm mediated infections is an insurmountable concern due to innate characteristics of microorganisms or the biofilm structure. The failure of antibiofilm strategies is due to lack of effective penetration into the biofilm matrix. The biofilm matrix comprises polysaccharide (55-60%), protein (45-50%), lipid (30-35%), and extracellular DNA (1-10%) (e-DNA). E-DNA pre-conditions the surface, renders the matrix cohesive and elastic and is considered essential for establishment and maturation of biofilm. We hypothesize that degrading e-DNA using Deoxyribonuclease (DNase I) would destabilize the biofilm structure and facilitate deeper penetration. The findings imply that prevention ofP. aeruginosa PAO1 biofilms (pretreatment) by 60% can be done with 10 µg/ml of DNase I. For removal of pre-existing biofilms formed by P. aeruginosa PAO1 (post-treatment), 10 µg/ml of DNase I with 15 minutes of contact duration resulted in 80% reduction in biofilm. The efficacy of DNase I for removal of biofilms reduced with the age of biofilm. However, inclusion of the divalent (Mg ++) ions, co-factor for DNase I, resulted in 90% removal of biofilms irrespective of age of biofilm. Moreover, reduced concentration of DNase I, 1.5µg/ml with only 5 min contact time effectively removed P. aeruginosa biofilm. DNase I can be considered as a suitable antibiofilm ingredient to potentiate conventional antimicrobials used in food industry. Future studies may include antibiofilm formulation and modification of DNase I to render it robust, stable over a range of temperature and pH prevalent in foods processing.

Keywords: Biofilms; formulation; polysaccharide

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MICROBIAL DEGRADATION OF PADDY STUBBLE

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Abstract: Punjabgenerates19.7milliontonesofpaddystrawonabout30lakhhectaresofagriculturallandeachyear.Ofthis,only4.3milliontones (roughly22percent)isusedinbiomass-based power plants, cardboard units and as fodder, Paddy cultivation if manually harvested then stubble left over is mostly ploughed back into the fields and act as organic fertilizer. However using combine harvesters leaves behind foot longstubble which is difficult to be ploughed back into the soil.Uprooting, cutting, collecting is labour intensive and expensive. The easiest and cheapest method adopted by farmersis to burn it in the field itself. The burning of stubble has been captured vividly by NASA, notably since 2015, whose satellite photographs showed a dense cluster of red spots among a brown coloured region of agricultural fields. Stubble burning is yearly phenomenon taking place over three weeks in October-November, releasing particulates and smog-forming carbon monoxide and nitrogen oxide, which drift from the fields over almost the entire Indo-Gangetic plain. This pollution contributes around 12-60 percent of particulate concentrations depending on the generation of other pollutants in different locations, winds,temperature and other local factors. Farmers themselves are doubly harmed, by the local air pollution caused, and by the loss of soil nutrients such as nitrogen, potassium, phosphorous and sulphur due to the burning.Shortage of (mostly migrant) labour,high cost of machines that can handle or plough back the stubble augmenting soil organic matter, is a major deterrent also there is a dearth of alternative treatment as well as management strategy for efficiently handling the paddy stubble in the fields. There are many options for handling and utilization of paddy straw stubble, for example process of separation and extraction of fibers from non-fibrous tissues and woody part of the stem through dissolution and decomposition of pectins, gums and other mucilaginous substances using microbes and chemical methods is called retting. Retting utilizing microbes would depend on field conditions, type and texture like spiky, coarse, harsh and pliability .of plant portion We discussmicrobialrettingmethodswhichwillprovideanswertheburningquestionofhowtohandlepaddystubble.

Keywords: Biomass; Indo-Gangetic; pectins

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MONO-BIOTINYLATED PROTEINS AS REAGENTS FOR IMPROVED IMMUNOASSAYS

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Abstract: Immunoassays serve as key tools for the detection of antigens and antibodies for diagnosis of both infectious and non-infectious diseases. However, passive coating of proteins during immunoassays is random, inefficient, and requires large amount of proteins. We envisaged that the sensitivity of currently used antibody detection assays could be improved significantly through directional immobilization of target proteins during antibody detection. The high-affinity interaction between biotin and streptavidin has opened avenues to achieve efficient and directional immobilization of recombinant proteins. The proteins can be mono-biotinylated in a site-specific manner using a 15 amino-acid long Biotin Acceptor Peptide (BAP) tag that carries a single lysine residue to which a biotin moiety can be attached either by co-expressing E. coli BirA enzyme in vivo during protein expression or using a purified recombinant E. coli BirA enzyme in vitro. We have designed a T7 promoter-lac operator-based expression vector for rapid and efficient cloning, and high-level E. coli-based cytosolic expression of proteins carrying a C-terminal BAP tag and a TEV protease cleavable N-terminal decahistidine tag for initial purification. Furthermore, a robust three-step chromatography pipeline integrated with well-optimized and highly efficient protocols for TEV protease-based H10 tag removal, and recombinant BirA enzyme-based site-specific in vitro biotinylation has been optimized to obtain highly pure tagless proteins. Using five mycobacterial proteins of diagnostic importance as an example, the study clearly demonstrates that specific capture of mono-biotinylated proteins on streptavidin-coated surface leads to an increase in indirect ELISA detection sensitivity by 10-100 fold with both monoclonal and polyclonal antibodies, even when proteins are multiplexed. This is due to the uncompromised and uniform capture (coating) of target proteins on streptavidin surface as compared to random coating on passive surface where protein characteristics can dictate coating behaviour. The simplified and well-optimized strategy will find use in numerous applications, especially those, which require capture of multiple proteins on solid surfaces, and is likely to revolutionize the serological immunoassays.

Key words: Mono-biotinylated proteins, immunoassay, serodiagnosis, directional immobilization, streptavidin.

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STRUCTURE-BASED VIRTUAL SCREENING FOR THE IDENTIFICATION OF NOVEL NATURAL INHIBITORS OF HOMO SAPIENS CYCLIN DEPENDENT KINASE 5 AGAINST ALZHEIMER'S DISEASE

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Abstract: Alzheimer's disease (AD) is the progressive neurodegenerative disorder and characterized by the brain cell death, memory loss and is the most common form of dementia. Although AD has devastating effects however, drugs which can treat the AD remain limited. The cyclin-dependent kinase 5 (CDK5) has been involved in the pathological hyperphosphorylation of tau protein, which leads to the formation of neurofibrillary tangles and is one of the prominent hallmark of AD. The structure based virtual screening approach was utilized to predict the potential compounds which can be used as inhibitors against Homosapiens CDK5 (HsCDK5). The natural compound subset from the ZINC database which have all the primary and secondary metabolites (n=1,67,741) were retrieved and screened by using virtual screening method. From this screening we have predicted 297 potent inhibitors. These predicted compounds were evaluated through their pharmacokinetic properties by ADMET descriptors. Finally, 17 compounds were selected and used for re-docking. After the refinement by molecular docking simulation and by using drug-likeness analysis we have identified four potential inhibitors (ZINC85877721, ZINC96114862, ZINC96115616 and ZINC96116231). Then these four ligands were employed for 100 ns MDS study. From the RMSD, RMSF, Rg, Number of hydrogen bonds, SASA, PCA and binding free energy analysis we have found that out of four inhibitors ZINC85877721 and ZINC96116231 showed good binding free energy of -198.84 kJ.mol-1 and -159.32 kJ.mol-1 respectively and also good in other structural analyses. Collectively, these findings recommend that two compounds ZINC85877721 and ZINC96116231 have great potential to be promising agent against AD to reduce the CDK5 induced hyperphosphorylation and could be considered as therapeutic agents for the AD.

Keywords: Alzheimer's disease, Neurofibrillary tangles, CDK5, Virtual Screening, Molecular Docking, Molecular Dynamics Simulation

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SUSTAINABLE PACKAGING MATERIAL

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Abstract: Petroleum derived plastic litter are encountered in aquatic ecosystems across the globe, including polar environments and the deep sea causing environmental problem. Biodegradable plastics are best used in the making of products where biodegradability is of intrinsic value. Bioplastics are used in food packaging material and are derived from renewable agro and biomass sources such as vegetable fats, oils, starch, cellulose and microbiota. In the present study starch is isolated from different tubers (S.tuberosum, C. esculenta, I.batatas, A. paeoniifolius) which were collected from local market. Approximately 9.7gm starch from the I.batatas, 18.2gm starch from S.tuberosum and 6gm from A. paeoniifolius can be isolated from 500 gm of fresh tubers. To enhance starch bioplastic mechanical property and water barrier property the starch was blended with other polymer and bioplastic film developed.

Keywords : Sustainable packaging, Starch, Tubers.

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ONTOLOGY PREDICTOR: A TOOL FOR PREDICTING ONTOLOGIES IN NEXT GENERATION SEQUENCING DATASETS

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Abstract: Next Generation Sequencing uses massively parallel sequencing methods producing millions of reads at a stretch. In order to understand complex biology we require a systematic approach that uses computational aspects to make biological inferences from different genomic and transcriptomics datasets. Assigning the ontologies to all the transcripts can help us in extracting meaningful information at an instant pace. Currently, BLAST2GO program is most popular for ontology prediction, but it has a limitation of not being freely available. Ontology predictor can be used to retrieve GO annotation which differentiates input sequences according to molecular function, biological process and cellular component ontologies.We have developed a next generation sequencing ontology prediction tool, which can perform various automated functions with only one command, including mapping of transcripts to annotation and further deriving ontologies for them. Ontology predictor uses eight perl internal scripts to assign ontologies to all the input sequences.

Keywords: Next Generation Sequencing,Ontology, cellular component, automated functions

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BIOCHEMICAL EVALUATION OF ANTIOXIDANTS IN THE SUSTENANCE OF VIGNA RADIATA UNDER FLUORIDE STRESS CONDITIONS

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Abstract: Fluoride stress is one of the most important Abiotic stress. Fluoride adversely affects plants by moving the level of ROS species up and negatively regulates plant growth. In the present study; Vigna radiata was exposed to fluoride stress in half strength Hoagland Solution. In the present study, concentration dependent analysis (0, 2.5, 5, 7.5, 10, 12.5, and 15 mM of NaF) of antioxidant enzyme's activity against Fluoride stress was performed. More significant inhibition in Growth and MDA content levels, H2O2 accumulation and decrease chlorophyll content were reported in the NaF treated seedlings than control. Significant increase in Na+ concentration was recorded in root and leaf sample with increase in NaF concentration. Expression of Antioxidants (SOD, APX,) showed the highest activity at 7.5 mM of NaF and showed significant defense against fluoride stress in collecting manner. This study would be supportive in understanding the role of Antioxidants for survival of the plant against fluoride stress.

Keywords: Antioxidant enzymes, Vigna radiata (L.). Fluoride stress.

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IMPROVED PROTOCOL FOR CALLUS INDUCTION FROM LEAF EXPLANT OF ANNONA SQUAMOSA L.

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Abstract: This work aimed to build up an well-organized method of callus induction from leaf explants of the Annona squamosa L. for the callus induction of A. squamosa L. on Murashige and Skoog (MS) media and with various combinations of benzilaminopurine (BAP) and naphthaleneacetic acid (NAA). There were 10 treatments (BAP+NAA) with five replications designed. The effects of treatments were evaluated after three weeks with the best percentual callus formation using media with BAP + NAA (2+1; 2+2; 3+2; 4+2; 4+3 mg L-1). These results propose that the callus in vitro production is promising with leaf explants of A. squamosa L., and will help in studies; especially in enhancement of Secondary metabolite by using Cell suspension culture induced by Chemical electors.

Key words: Annona squamosa L., Benzilaminopurine (BAP); Naphthaleneacetic acid (NAA), Callus Innduction

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CHARACTERIZATION OF STREPTOMYCES ISOLATE RK-320 OBTAINED FROM BIODIVERSITY RICH HIMALAYAN LIMESTONE ROCK, DEHRADUN FOR BIO-CONTROL OF PLANT PATHOGENS

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Abstract: A promising Streptomyces sp. RK-320 was obtained from under explored biodiversity rich Himalayan limestone rock, Dehradun. It was characterized by using polyphasic approaches (morphological, biochemical, physiological, molecular and chemotaxonomy). Colony characteristization was recorded; morphology was observed under Scanning Electron Micrograph and was characterized for production of indole, siderophores and various enzymes and Fatty Acid Methyl Esters. It was identified by 16S rDNA sequencing and obtained sequence has been deposited in GenBank (Accession MH511607.1). The isolate RK-320 and its ethyl acetate extract were further analyzed for antimicrobial activities against wheat pathogens - Fusarium graminearum and Bipolaris maydis. Ethyl acetate fractions obtained after chromatography were analyzed for antimicrobial activity against same target organisms. The active fractions were pooled and compounds were identified by GC-MS analysis. Results showed that the aerial and substrate mycelia of isolate of RK-320 were white and brown, respectively with smooth spores. Brown diffusible pigment production was observed. The isolate produced protease, lipase, amylase, cellulase and siderophores. It did not produce indole. Major fatty acids of the isolate RK-320 were C15:0 iso (29.93 %), C15:0 antesio (14.79 %), C16:0 (10.64%). Phylogenetic analysis based on similarity of 16S rDNA showed 100% similarity with Streptomyces enissocaesilis and S. rochei. Ethyl acetate extract of the isolate RK-320 produced antimicrobial activity against wheat pathogens. Many tentatively novel compounds that belonged to chemical categories - Enone, alkane, aldehyde, fatty acids, aldehyde, amide, esters, hydrocarbons were obtained. Compounds (dodecane, 1-pentadecene, tetradecane, 1-hexadecene, hexadecane, heptadecane, 1- heptadecene, heneicosane, 1-nonadecene, tetracontane) obtained ut these compounds have not been reported from S. rochei and S. enissocaesilis. Documented reports suggested that there are marked differences in morphological, biochemical and chemotaxonomy characteristics of RK-320 from closely related species. Hence, the isolate RK-320 can be considered as atleast novel strain. The identified antimicrobial compounds may be useful in developing novel bio-control agents for plant pathogens.

Keywords: Streptomyces sp. RK-320; antimicrobial activities; antimicrobial

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ROLE OF ENDOPHYTES DURING STRESS FOR GROWTH OF WHEAT *(TRITICUM AESTIVUM)*

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Abstract: Major challenge for plant growth is shortage of water and it limiting the crop productivity. Drought plays a major role in destabilizing the productivity in wheat plant, wheat are often exposed to drought, which adversely affects both yield and seed quality worldwide. Drought is expected to cause serious plant growth problems for more than 50% of the arable lands by 2050. Several beneficial plant-microbe interactions that could enhance plant yield and health have been studied and utilized for the benefit of agricultural productivity over the last few decades. Endophytic bacteria can be defined as those bacteria that colonize the internal tissues of the plants showing no external sign of infection or negative effect on their host. Microbial communities are able to develop a range of activities that are very important in maintaining biological balance and sustainability in soil particularly under stress conditions Under stress conditions, plants are more dependent on microorganisms that are able to enhance their metabolic activity to combat stress. Plant Growth Promoting Rhizobacteria (PGPR) are beneficial native soil bacteria that colonize the rhizosphere or plant roots. They also adapt to adverse conditions and may protect plants from the deleterious effects of drought stress, thus increasing crop productivity in arid or semiarid areas. The aim of the research work is to compare bacterial isolates from wheat seeds of stressed and controlled environments and check for their capacity to enhance drought stress tolerance of wheat (Triticum aestivum). Endophytic bacteria may in future be even more important than rhizosphere bacteria, because they achieve more intimate contact with plant tissues and thus escape competition with rhizosphere microorganisms.

Keywords: Endophytic bacteria, Wheat, Drought tolerance

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DIABETIC NEPHROPATHY AND PHYTOCOMPOUNDS AS THEIR THERAPEUTIC AGENTS

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Abstract: Diabetes mellitus has become worldwide concern which often leads to the problem of diabetic kidney disease (DKD) and is the latent cause of microvascular disorders such as diabetic nephropathy (DN) and retinopathy. The most common cause of ESRD is DN where kidneys become increasingly ineffective in the clearance of toxins and drugs from the body. Hyperglycemia leads to alterations in the normal pathway of the kidney cells such as increased glycolysis upregulates four distinct pathways: Polyol pathway, Hexosamine pathway, production of Advanced Glycation End products (AGEs) and activation of protein Kinase C (PKC) pathway. The above pathway continues and leads to increased expression of NF-κB (transcription factor) which is associated with decreased GFR, increased proteinuria, increased glomerulus and tubular injury; increased production of transcription factor TNF-α, TGF-β1. AGEs production lead to increased ROS and increased production of some cytokines and growth factors, upregulation of TGF-β, laminin, type IV collagen, fibronectin which ultimately causes renal cell hypertrophy. Hyperglycemia also affects inflammatory pathway by releasing various cytokines, growth factors, transcription factors and contributes to glomerular hypercellularity, endothelial apoptosis, etc. There are various synthetic therapeutic agents that targets enzyme, proteins, inflammatory cytokines, growth factors and transcription factors. Medicinal plants and their bioactive constituents are considered to be safer and more effective than synthetic medicines against various chronic diseases. Phytocomponds can be used as a safe and effective way to target inflammatory cytokines and molecules related to diabetic nephropathy.

Keywords: Hyperglycemia; diabetic nephropathy; pathway; phytocompounds; kidney.

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COMPARATIVE STUDY OF SELECTED INDIAN MEDICINAL PLANTS

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Abstract: The phytochemical analysis of plants is very important as they are of great interest in the pharmaceutical industries as well as in the formation of commercial products. Medicinal plants have bioactive compounds which are used for the treatment of various human diseases and also play an important role in healing. Phytochemicals are divided in two categories i,e., primary and the secondary constituents. Primary constituents includes amino acids, proteins, chlorophyll, and sugar whereas, secondary constituents includes phenol, flavanoids, carbohydrates, terpenoids and alkaloids. Present study involves comparative analysis of phytochemicals and assessment of antibacterial properties of three different medicinal plants, Terminalia arjuna (Arjuna), Trachyspermum ammi (Ajwain) and Tribulus terristris (Gokhru). The bark of Terminalia arjuna and leaves of Trachyspermum ammi and Tribulus terristris collected from Noida were washed, air dried, coarsely powdered and then subjected to steam distillation, using methanol. Qualitative screening for phytochemical testing was carried out for all the extracts as per the standard methods. Tribulus terristris showed high contents of terpenoids and significant amount of saponin and alkaloids. Trachyspermum ammi showed high amount of alkaloids and saponin. Terminalia arjuna contains proteins and amino acids in high quantity along with flavanoids and alkaloids in significant amount. Later the presence of phenol was confirmed with quantitative estimation. It was found to be highest in Terminalia arjuna then in Trachyspermum ammi and Tribulus terristris. Antibacterial activities of plant extract were investigated by the disc diffusion method. The sensitivity of the microbes species to the plant extract were determined by measuring the size of zone of inhibition (diameter of disc). It was found to be maximum for Trachyspermum ammi for both E.coli and B. Subtilis and then in Terminalia arjuna and Tribulus terristris.

Keywords: Medicinal plants, phytochemicals, antibacterial, bioactive

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PROTEIN NETWORK ANALYSIS IN UROLITHIASIS

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Abstract: Urolithiasis is a term used to describe a condition in which stones are developed in the urinary tract (kidneys, ureters and urinary bladder) leading to pain, bleeding or infection. The most commonly occurring stones includes calcium oxalate (CaOx) and calcium phosphate (CaP).This clinical problem arises due to super saturation of the urine and alterations (up-regulation or down-regulation) in the cellular proteins has been observed in response of such stones. Various studies have been carried out for the identification and characterization of such stone associated proteins but their functional significance still remains unknown. Protein network analysis, therefore plays an important role in carrying out the functional studies of these identified altered proteins. Protein network analysis helps in the creation of protein-protein interaction networks which has significant role in the isolation of groups of interacting proteins which are responsible for the same biological process. This review basically focuses on the protein network analysis of such altered proteins identified previously in order to know about their functional significance.

Key Words: Urolithiasis; Proteins; Protein network analysis; Functional study

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PRESENCE OF EDC'S IN THE AQUATIC SYSTEM

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Abstract: The presence of endocrine disrupting compounds (EDCs) in the aquatic environment can alter biological functions in organisms, at relevant concentration and imposes a serious threat to the organisms and humans; yet there is a little understanding of its exposure and consequences to the ecosystem. Herein, we will assess the data on their effects in aquatic systems but the pervasive nature EDCs and their multiple sub-lethal impacts on biodiversity makes the assessment important as well as highly challenging. Mass-based analytical methods for sample preparation (LLE, SPE) show great sensitivity and precision for the quantification, while determination in different biological and biological matrices is done by liquid chromatography coupled with mass spectrometry. Some studies of certain EDCs affecting hypothalamic-pituitary-gonadal (HPG) axis of vertebrates provides technically a robust basis for using Fish models tests to assess the action mechanisms of EDCs affecting vertebrates. Occurrence of these compounds is due to inappropriate use, uncontrolled disposal of various chemicals and lack of regulations, which are detrimental even in minute concentrations (ng/L to µg/L), is the major reason for its increasing exposure. While conventional treatment methods are insufficient in EDCs removal, other technologies such as ozonation causes long term problems of water supply and sanitation especially in the developing countries, in spite of present technologies, a more advanced and efficient water treatment technique (chemical , physical and degradative) is needed which can be achieved a more pragmatic research taken in the respective field. Hence, prevention of such compounds by several ways is as important as creating an awareness among people about theaquatic pollution due to rising levels of EDCs. Moreover, an improvised risk assessment of EDCs requires ecologically oriented research along with field-based study at levels of aquatic system and its populations.

Keywords: Endocrine disrupting Chemicals, Aquatic system, HPG axis, Advanced water treatment, Aquatic pollution.

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PROTEOMIC ANALYSIS OF RENAL STONE MATRIX

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Abstract: Renal stones have long been linked with a higher risk of causing chronic kidney diseases and associated illnesses such as hypertension etc. The process of renal stone formation involves various physiochemical changes including the supersaturation of urine resulting in a structure containing a crystalline (mineral) and a non-crystalline (organic) phase. Renal stone mineral composition has been well understood and incorporated as a routine part of stone removal, however, the protein composition, an essential fraction of the stone matrix has been inadequately understood and not adeptly established. Progress on the identification and characterisation of matrix proteins has been slow, however, recent studies have begun to exploit the potential of certain modern proteomic methodologies in analysing human kidney stone matrixes, with patterns starting to emerge in the kind of proteins being found. Thus, proteomics analysis may enable researchers to link protein-crystal pathways with their functional roles with the help of bioinformatic tools and provide a better insight into the process of stone formation which may not only guide the treatment of frequent stone formers but also aid in prevention.

Keywords: Proteins; Proteomics analysis; Protein-crystal pathways; Stone matrix

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SYNTHESIS, SPECTRAL CHARACTERIZATION AND ANTIMICROBIAL EVALUATION OF SCHIFF BASE CU (II), NI (II) AND CO (II) COMPLEXES

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Abstract: Several synthetic and natural macrocyclic compounds have been investigated. The chemistry of transition metal complexes has attracted the interest of both inorganic and bioinorganic chemists in recent years because of its importance in the area of coordination chemistry. Schiff base complexes are considered to be among the most important stereochemical models transition metal coordination chemistry due to their preparative accessibility and structural variety. Schiff bases are potential anticancer drugs and, when administered as their metal complexes, the anticancer activity of these complexes is enhanced in comparison to the free ligand. There are several modern areas of interest on which coordination chemistry can focus attention. In present study, Mn (II) complexes of the type [HLXM2] where M=Cu (II), Ni (II), Co(II) and X=Cl OAc have been synthesized by condensation of acetylacetone and thio-carbohydrazide (2:2) in the presence of divalent metal salt in methanolic medium . The complexes have been characterized with the help of elemental analysis, conductance measurement, magnetic measurement and their structural configuration have been determined by various spectroscopic (electronic, IR, 1H NMR, 13C NMR, GCMS) techniques. Electronics and magnetic moments of the complexes indicates that the geometrics of the metal centre are either octahedral. These metal complexes were also tested for their antibacterial and antifungal activities to assess their inhibiting potential.

Keywords: Schiff base, Metal complexes, Antimicrobial activity, Spectroscopic study

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ROLE OF VIMENTIN IN CHANDIPURA VIRUS INFECTION

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Abstract: Chandipura Virus (CHPV) is aVesiculovirusbelongs to theRhabdoviridaeFamily. Theneurotropic behavior of CHPV is partly understood in experimental animals but the proteins of neuronal cells interacting with CHPV are unknown. In order to understand this interaction, we carried out Virus Overlay Protein Binding Assay (VOPBA). The VOPBA assay showed few proteins from the Neuro2a (N2a) cell membranes were interacting with the CHPV. These proteins were identified with Q-TOF LC-MS analysis. One of the protein was the intermediate filament protein Vimentin. The expression of Vimentin on the N2a cell surface was confirmed with immunofluroscence assay using Anti-Vimentin antibody. In order to confirm the interaction of CHPV with vimentin, Infection Inhibition assay was performed using anti-vimentin antibody. Inhibition assay showed reduction in CHPV progeny yield at 48hrs post infection. Vimentin mRNA expression in CHPV infected N2a cells was quantified by Syber Green qRT-PCR. The results revealed that there was no significant change in the vimentin mRNA expression. From the results we conclude that vimentin may play a role in virus entry. However, detailed studies are necessary to confirm the role of vimentin in CHPV infection.

Keywords: Chandipura Virus, VOPBA, Western blot, qRT-PCR

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ROLE OF PROBIOTICS IN PREVENTION OF ALCOHOLIC LIVER DISEASE

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Abstract: Excess alcohol consumption is a global crisis contributing to over 3 million alcohol-relateddeaths per year worldwide and economic costs exceeding $200 billion dollars. According to clinical and experimental models, excessive alcohol consumption results in multiple organ injury and Alcoholic liver disease (ALD) encompassing a broad spectrum of disorders including fibrosis, cirrhosis, steatosis, etc. Alcohol is absorbed mainly in the digestive tract . 90% of the absorbed alcohol is metabolized in the liver while remaining 10% is discharged via expiration, urine and perspiration. Alcohol is oxidized to acetaldehyde by various liver enzymes, such as alcohol dehydrogenase, catalase, etc., which is further enzymatically oxidized to harmless acetic acid. Meanwhile, alcohol is readily metabolized to acetaldehyde by enteric microorganisms that modifies gut permeability and microbiota equilibrium which in turn result in increased levels of pathogen-associated molecular patterns such as lipopolysaccharide, bacterial translocation, etc., causing direct hepatocyte damage. In patients who consume alcohol over a long period, an increment of Gram negative bacteria cause endotoxemia and hyperactivation of the immune system. Recently, probiotics, live lactic acid bacteria and other genus (i.e. Bacillus spp.) in the intestine have been reported to convert ethanol into acetaldehyde and further to acetic acid, thereby suppressing the absorption of alcohol and acetaldehyde, associated with hepato-protective activity by reducing or preventing the progression of ALD. A potential mechanism is transformation of intestinal microbiota by probiotics. However, not all enteric bacteria have such a function. While this appears to be a promising therapeutic strategy for the treatment of intestinal barrier dysfunction, there is a scarcity of research that studies probiotics in the context of ALD. Therefore, there is a need for developing the bacterial compositions that functions to prevent the absorption of alcohol and acetaldehyde and protect the liver.

Keywords: Probiotics; Alcohol; Alcoholic Liver Disease; Intestinal microbiota; Lactic acid bacteria.

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MARKET FEASIBILITY ANALYSIS FOR CHITOSAN

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Abstract: Chitosan is a natural polymer composed of N-acetylglucosamine and glucosamine units, commercially isolated from by-products of the fishing industry and aquaculture. For almost fifty years, chitosan has been a promising biopolymer and its use has been proposed in several fields, such as medicine, food industry, agriculture, cosmetics, biotechnology and so on. With constant betterments in production, characterization and purification of chitosan, this polymer's market has a compound annual growth rate (CAGR) of ~15%. Asian countries, mainly Japan and China, dominate the chitosan market owing to the abundant availability of raw material in the area. Other countries are expected to witness significant growth in chitosan production owing to increasing consumer demand for bio-based products. Global market analysts believe that chitosan market share is projected to reach beyond 1 billion USD by 2022. Chitosan prices depend on the quality and physicochemical properties of the polymer. The polymer is hence divided into three types, based on its degree of deacetylation (DD) - technical grade (DD≤75%), pure grade (DD >75% and < 90%), and ultra-pure grade (DD≥90%). Cost for ultra-pure grade polymer can reach hundreds or even thousands of dollars per kilogram for its uses in pharmacy, biomedicine or cosmetics industry. The current methods of production of chitosan using strong alkali and strong acids have certain environmental impacts, and thus, companies involved in the production of the polymer are switching towards green biotechnology methods and making use of bacteria for the degradation of crustacean shells.

Keywords: Chitosan, Degree of deacetylation, Biopolymer, Asia, Global market

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CHITOSAN: AN ADSORBENT IN WASTEWATER TREATMENT

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Abstract: Chitosan is a linear polysaccharide composed of randomly distributed β-(1→4)-linked D- glucosamineand N-acetyl-D-glucosamine.
Chitosan is extracted bytreating the crustacean's shells of shrimp with an alkaline substance e.g.: sodium hydroxide. In the wake of rapid industrialization, urbanization and population explosion, natural resources are continuously getting polluted. Effluent waste from industries considerably pollutes the environment. It is of major concern as the discharged heavy metals and other toxins are harmful to the ecosystem. Chitosan being natural additives are biocompatible and are biodegradable at the same time. Hence being low in toxicity level and from renewable resources attracted attention of many researches due to their high ability to retain different pollutants from wastewater. Bio adsorption process is one of the mainly adopted methods to recycle and reuse the wastewater. Hence the present study focused in assessing the usage of chitosan, a marine biopolymer extracted from the locally available shells of crab as an adsorbent. The -OH and –NH2 functional groups which are present in the chitosan facilitate the great adsorbent and hencemake it an ideal adsorbent for the treatment of wastewater. Furthermore the increase in the adsorption ability by modification in the chitosan structure leading to the formation of different derivatives and chitosan composites gained much attention and hence are being widely studied. This review article brings to light that chitosan is function as an economically useful adsorbent for the treatment of electro plating effluent containing heavy metals.

Keywords: Adsorbent, Wastewater treatment, Chitosan, Heavy metals, Effluent

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HUMAN DENTAL PLAQUE: A CASE OF MULTI-SPECIES BIOFILM

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Abstract: Oral cavity has been observed to be one of the regions of complex and diverse micro-organisms where they interact with each other leading to development of multi-species biofilm. Multi-species biofilm is the pool of many distinct micro-organisms (including both bacteria and fungi), created and stabilized within their self-produced extracellular matrix where they prominently interact with each other leading to infections. Human dental plaque is an outcome of such interactions leading to many of the oral problems like dental caries (tooth decay or cavity), gingivitis (inflammation of gums), periodontitis (damage to gums and jawbone). The plaque consists of both bacteria and fungi along with the matrix produced by the micro-organisms itself which provides them the appropriate circumstances to grow. The oral micro-organisms get adhered to the tooth surfaces and soft epithelial tissues for the constant flow of host secretions which provides them the ability to get transformed from planktonic cells to sessile mode of growth leading to the formation of human dental plaque. This review basically focuses on the human dental plaque, its development, the related interactions leading to its development and a few of its related therapeutic approaches.

Key Words: Bacteria; Development; Fungi; Interactions; Therapeutics

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EDIBLE MUSHROOM MYCELIUM: BOON FOR NUTRACEUTICAL APPLICATIONS

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Abstract: In today's scenario, people are more inclined towards a new diet health paradigm that emphasizes more on the positive health benefits of diet in place of basic food nutrition. Due to health concerns there is continuous rise in the demand of nutraceutical rich products and therefore, in order to meet the requirements, it is necessary to enhance the quality of basic diet by supplementing nutrients. In developing countries like India, utilization of mushroom mycelium in various forms could serve as a promising approach. Mushroom as nutraceuticals has been utilized extensively in the last two decades and the demand is still rising. Mushrooms have remarkable amount of different bioactive components (phenols, β-glucans, minerals, triterpenoids etc.) which have proven to be effective against many diseases like cancer, tumor, diabetes etc. Mushroom fungi are highly season specific and take a longer duration to yield the fruiting body. Hence, production of nutraceuticals from mushroom mycelium can serve as an alternative to meet the demand for nutraceuticals throughout the year.

Keywords: Mushroom mycelium, Nutraceutical, Fungi.

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ICABB-059

STEVIA REBAUDIANA: AN UNDERUTILIZED SWEETENER

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Abstract: Stevia rebaudiana is herbaceous perennial plant, native of South and Central America. Distinctive properties of this sweetening herb were known to tribal people of South America since centuries. Plant owes its sweetness to steviol glycosides. About eight diterpene glycosides viz. stevioside (9.1%), rebaudioside A to E (0.6%-3.8%), dulcoside A (0.6%) and steviol bioside are present in its leaves. Plant leaves produces Stevioside which are chemically ent-kaurene diterpene and have nutraceutical properties. Steviosides are zero-calorie and high potency sweeteners about 300 times sweeter than cane sugar. Besides its sweetening property, stevia is also known for ethno-medicinal properties such as they have antimicrobial, anti-hyperglycemic, anti-hypertensive, anti-inflammatory, anti-tumour, anti-diarrhoeal, diuretic and immuno-modulatory effects. Other than glycosides, stevia is source of various micronutrients such as ascorbic acid (vitamin C), β-carotene (vitamin A), chromium, cobalt, magnesium, iron, cobalt potassium, riboflavin, zinc etc. In light of various studies which evident its health promoting qualities, keeping in view of its increasing demand owing to glycemic properties coupled with renewed global interest in traditional ethno-pharmacy. Commercial cultivation of stevia has become very attractive these days, however, extensive research is required to improve the yield of steviol glycosides in the plant to meet the commercial demand.

Keywords: Antioxidant, glycosides, stevioside, diterpene, Stevia rebaudiana.

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EXPRESSION ANALYSIS, OPTIMIZATION AND SOLUBILISATION STUDY OF CHIMERIC HUMAN INTERFERON REGULATORY FACTOR-1 (IRF-1) PROTEIN IN E.COLI

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Abstract: Suppression and mutation(s) in Tumor suppressor gene is the main cause of uncontrolled cell proliferation that leads to oncogenic transformation of normal cells. Out of ten tumor suppressor genes known so far, IRF-1 is the one whose suppression and mutations are reported from several types of Human cancers like gastric, pancreatic, breast etc. IRF-1 gene codes for a mammalian transcription factor which serves following vital functions in cell like cell-cycle regulation, specialization of immune cells, autophagy, antiviral pathway etc. We here first time are reporting full length human IRF-1 cDNA cloning, expression in E.coli/ BL21 cells with achieved complete solubilisation of recombinant protein expression. We cloned the gene by RT-PCR technique using gene ORF specific primers followed by expression of recombinant IRF-1 in E.coli as GST fusion system. Profound expression of recombinant protein was observed in E.coli after inducing with 0.5 mM IPTG for 3hrs at 37°C. We observed two degradation products of low molecular mass besides full-length chimeric protein. We successfully minimized the low molecular mass degradation products of GST-IRF-1 protein at 20°C. Simultaneously, we achieved the expression of recombinant protein in soluble fraction of E. Coli/BL21 cells at 20°C, which is crucial for the study of the biological functions of any protein. We further confirmed it by immunoblot using anti IRF-1 and anti-GST antibody under induction of E.coli cells harbouring the IRF-1 recombinant plasmid after sonicated fractionated fractions. This work shall be served as platform to characterize the recombinant protein that my pave way to understand molecular mechanism of tumour suppression caused by this molecule.

Keywords: Mutations, Tumour suppressor gene, cDNA, cloning, proteins.

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MARINE FUNGAL ISOLATES DERIVED BIOFUELS: AN APPROACH OF A SUSTAINABLE FUTURE

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Abstract: A global survey on world energy consumption by World Bioenergy Association (2017) had revealed a heavy dependence of developed and developing nations on non-renewable energy sources. Slow but steady acceptance of renewable sources has shown an annual increase of 1% in global energy production from renewable sources. Biofuel, a contemporary product from enzymatic processing of agricultural products or bio- resources fermentation is the suitable alternative for non-renewable resources. The two most commonly used biofuels are biodiesel and bioethanol which can be used as a substitute for diesel and petrol respectively. However, the use of raw vegetable oils as fuel may give rise to a variety engine problem and excessive engine wear. Since most of the products are produced via fermentation of agricultural residue, there is always a dependence on cultivation This necessitates the need to explore alternative cost-effective biofuel sources. Conventional agricultural residues have found a suitable replacement with marine fungal strains. Marine filamentous fungi possess the metabolic capacity to assimilate organic matter like cell wall carbohydrates and polyphenol complexes as sources of carbon for their conversion to biofuels. Marine algae such as Undariapinnatifida, Chlorella vulgaris, Chlamydomonas reinhardti iand Kappaphycus alvarezii have also been reported as the efficient substrate for ethanol production with bacterial fermentation. In this review, we focus on the use of different marine fungi for the production of biofuels.

Keywords: Biofuel, Bio-resources, Marine algae, Fungal isolates.

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INNOVATIVE STRATEGY APPROACHES FOR DESIGN AND DEVELOPMENT OF AN EFFICIENT NASAL DRUG DELIVERY PRODUCT

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Abstract: Over the recent decades the interest in intranasal delivery as a non-invasive route for drug deliveryhas increased. Since, the nasal mucosa offers numerous benefits as a target tissue for drug delivery, a wide variety of therapeutic compounds may be administered intranasally for local, systemic and central nervous system. Apart from all the advantages that nasal mucosa provides, there are certain limitations also like –nasal cavity provides comparatively lesser absorption area to drugs than gastro intestinal tract (GIT), mucocilliary clearance (MCC) may affect the drug absorption. Therefore, in depth evaluation and innovative strategies are required for making this patient compliant route more effective and accessible. The relevant aspects of nasal anatomy, and the biological, physicochemical along with pharmaceutical factors needs to be considered during the process of discovery and development of nasal drug delivery products. Therefore, in this study we aim to summarize and critically analyse the various techniques used for the recent developments and prospects of absorption promoters and absorption modulator systems being developed commercially by companies specialising in nasal drug delivery of comparatively smaller molecular weight drugs, peptide and proteins.

Keywords: Nasal drug delivery, nasal anatomical and pharmaceutical factors, nasal absorption promoters.

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A COMPARATIVE STUDY ON EFFICIENCY OF A FUNGAL ENDOPHYTE ISOLATED FROM DATURA METEL AGAINST DIFFERENT VIBRIO CHOLERA STRAINS

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Abstract: The importance of endophytes in the quality and quantity of the crude drugs through a particular endophyte-host interaction has been the highlight of recent agricultural and medicinal studies. This indicates that more understanding on the particular relationships between endophytes and medicinal plants is required for promoting crude drug production. Fungal endophytes have gained interest because of their ability to produce secondary metabolites with different biological functions. Endophytes are fungi or bacteria (including actinomycetes) that can survive inside healthy plant tissues and establish a symbiotic relationship with their host plant. In this study, fungal endophytes were isolated from roots of Datura metel plant. Their secondary metabolites were extracted in different solvents and studied for their anti-microbial activities against various Vibrio cholera strains by agar-cup assay. Plant samples were collected from their natural habitats from Northeast region of India. Fungal endophytes were isolated using standard protocols. The fungal endophytes thus obtained were grown in Potato Dextrose broth (PDB) and cultured at 28°C for a week for the purpose of mass multiplication. They were then dried and crushed and the secondary metabolites were thus extracted with solvents of different polarity. 24-48 hour old Vibrio cholera strain cultures were grown for 248 hours and spread on the media plate evenly in a sterilized environment. Then, fungal endophyte extract were loaded in the cups formed by a cork borer, for the different solvents. The plates were then kept in the incubator at 37°C for 24 hours. Agar cup assay of a fungal endophyte against Vibrio cholera strains in different solvents showed zones of inhibition. Thin-Layer Chromatography and subsequent contact bio-autography were conducted to confirm the antimicrobial properties of the separated spots. The current study shows endophytes isolated from Daturametel roots with antimicrobial activities against Vibrio cholera, which supports the presence of bioactive compounds present in them.

Keywords: fungal endophytes, fungal endophytes, bioactive compounds, anti-microbial activities

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ANTIBACTERIAL ACTIVITY OF NEEM AGAINST NOSOCOMIAL PATHOGENS

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Abstract: Plants have been a potential source of herbal remedies throughout the history of mankind. Various medicinal plants have been used for years in daily life to treat diseases throughout the world. A study was carried to investigate the antimicrobial potential of Neem (Azadirachtaindica) leaves, against microorganisms Klebsiella pneumonia, Vibrio cholera, Staphylococcus aureus and Streptococcus pyogens. People who have weakened immune systems, or sick or injured or are undergoing procedures for various health issues, are more likely to get a nosocomial infection.

K. pneumonia, S. aureus and V. cholerae are spread through direct person-to-person contact, while S. pyogens can be spread through airborne droplets by sneezing or coughing. The rise of antibiotic-resistant strains of the bacteria has complicated matters, and therefore, an alternative of antibiotics is the need of the hour. Neem is used in traditional medicine as a source of many therapeutic agents in the Indian culture and grows well in the tropical countries. Neem is said to possess several antimicrobial properties and the versatility has made it a topic of research. Neem leaves were used in this study to find its antimicrobial property against the above mentioned nosocomial pathogens Neem leaves extract. Distinct zone of inhibition were seen against all the above mentioned bacteria. The MIC (Minimum Inhibitory Concentration) was also calculated. Thin Layer Chromatography (TLC) for the presence of bioactive compounds was performed. Contact Bioautography was also done in which the antimicrobial agents diffuse from a developed TLC strip to an inoculated agar plate. The present study was successful in identifying compounds with antimicrobial activity to different nosocomial infection which could be further exploited for isolation and characterization leading to the use of phytochemicals in the treatment of infectious disease especially in light of the emergence of drug-resistant microorganisms and the need to produce more effective antimicrobial agents.

Keywords: Azadirachtaindica, Medicinal plants, Nosocomial Pathogens

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GROWTH INHIBITION OF SALMONELLA TYPHI BY ENDOPHYTIC FUNGUS ISOLATED FROM ARGEMONE MEXICANA

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Abstract: The Salmonella is the most common Gram-negative pathogen that causes foodborne diseases such as, diarrhea, typhoid fever in humans. Endophytes are microorganisms that live inside the plant tissues without causing any harmful effects. It is reported that endophytic microbes are potential source of important bioactive compounds that can inhibit the pathogens. Endophytic fungi that is associated with medicinal plant Argemone mexicana, shows the antibacterial activity against Salmonellatyphi. Endophytic fungus was isolated from the root of the Argemone collected from Jorhat, Assam (26.20° N, 92.93° E), India. Endophytic fungus was inoculated in potato dextrose broth (PDB) media and incubated at 28°C temperature, 120 rpm for 2 weeks for mass multiplication. Secondary metabolites extraction from the endophytic fungus was performed using different organic solvents. The extracts were tested for the antibacterial bioassay against Salmonella. The Acetone and ethanol extracts of endophytic fungus show the best results against Salmonella.

Keywords: gram-negative, micro-organism, inhibition,Salmonellatyphi.

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PHYTOMINING OF PRECIOUS METALS

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Abstract: The gradual increase in growth of low-grade mining ores and metal contaminated soils around the world has been increasing exponentially. The ever rising demand of precious metals has opened a window of opportunity for phytomining which could become a cheaper alternative to excavation if the scale of production is large enough. Phytomining is based on phytoextraction process which exploits the ability of certain plants called hyperaccumulators to take up precious metals and their harvested biomass allows the metal to recover. To achieve uptake of precious metals, cyanide has proven to be the most effective agent to induce metal solubilization. Thus precious metal phytomining is strongly related to the ideas and technologies of conventional mining. The key difference is that instead of traditional practices, plants are used to absorb the metal and the precious metal is recovered from the plants. This review highlights the phytomining method and the development of phytomining projects across the globe.

Keywords: Phytomining, Phytoextraction, hyperaccumulators, metal solubilization, Conventional mining

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CHITOSAN AND ITS DERIVATIVES IN WOUND HEALING

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Abstract: Chitin and its deacetylated derivative chitosan are naturally occurring polysaccharides, commonly found in crustaceans shells, fungal cell wall and exoskeleton of insects. Chitosan has wide range of applications because of its excellent biocompatibility, biodegradability, non-toxicity and adsorption properties. Chemically modified or nano-fibrous chitin and chitosan have been developed recently, and their effects on wound healing have been evaluated. Chitosan can be made-up into a stable, porous bioscaffold via surface modification and lyophilization. However, blending with various additives may affect chitosan biocompatibility. Therefore, evaluation of biocompatibility of various biomedical-grade chitosan derivatives is necessary to engineer the material that is of high quality and biocompatible for human wound management. Chitosan is considered as a perfect material for hydrogels due to its biodegradable, biocompatible, non-toxic, antimicrobial, biologically adhesive, biological activity and hemostatic effect, as well as its amino and hydroxyl groups can be easily reacted and chemically modified, therefore allowing a high chemical versatility. Chitosan interacts with negatively charged molecules such as proteins, anionic polysaccharides and nucleic acids in bacterial membrane, which is the key to antibacterial properties. This review highlights the application of chitosan and its derivatives in wound healing.

Keywords: Chitosan, Chitin, Wound healing, Scaffold, Hydrogel

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BIOENERGY: DEVISING A SUSTAINABLE BIOECONOMY

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Abstract: Fossil fuel depletion and global environmental pollution are twin crisis for the World. Indiscriminate extraction and unjustified consumption of fossil fuels have led to significant reduction in the underground carbon reserves. The search for a reliable alternative source of energy has become indispensable in the current scenario. Biomass derived energy called as "Bioenergy" is one of the important renewable resources available to help meet the demand for energy in foreseen future. Various biomass-based energy resources explored includes biogas, biofuels, primary alcohols, vegetable oils etc. These alternative energy sources are environmental friendly and renewable. The techniques involved in deriving energy from biomass include thermo-chemical routes such as incineration, gasification, torrefaction and pyrolysis etc. The International Renewable Energy Agency has predicted a major role of modern, sustainable biomass technology in meeting the World energy demand and its expected growth in power, thermal and liquid fuel sectors. It is estimated that biomass derived energy will account for 20% of total primary energy supply by 2030. However, these sources of energy need to be investigated for their advantages, disadvantages, economic factors, scalability and applications.

Keywords: Bioenergy, Fossil-fuels, Biomass, Pollution, Biofuels

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HEALTH BENEFITS OF BARLEY: A PROMISING NUTRACEUTICAL

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Abstract: Nutraceuticals have gained a lot of attention by researchers as well as the common people, as they are useful in providing the health benefits and enhancing the well-being. In many different studies, Barley has been checked and identified as a new potential source of nutraceuticals. Results showed that it contains many effective nutrients and its beneficial properties make it, a good source of dietary supplements. Research done on its health benefits revealed that the proteins and soluble fibers present in barley, help in controlling cholesterol levels and blood sugar levels. It was also revealed that barley is a good source of antioxidants and phyto-chemicals. Other applications of barley as nutraceuticals are in prevention of many cardiovascular diseases. The high level of proteins, non- starchy polysaccharides and lower starch levels, makes it a perfect nutraceutical for the treatment of cancer. It has now a days became the major component for Food as well as Pharmaceutical companies. Considering its health benefits, these have become one of the top choices by consumers as compared to other certain products.

Keywords: Barley, Nutraceutical, Health Benefits

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HUMAN MICOBIOME : ROLE IN NEUROPSYCHATRIC DISORDERS

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Abstarct: The microbiome is now recognized by some as an organ of the human body. The intestinal microbiome is a significant part of the complete human microbiome and has a bi-directional relationship with various organ systems, particularly the central nervous system.The intestinal microbiome contains approximately 150 times more unique genes than the human genome. The intestinal microflora represents over 200,000 to 1,000,000 bacterial genes. The microbiota can be described as metabolic 'organ'.The most common phyla in the small intestine are Firmicutes and Bacteroidetes, Proteobacteria, Actinobacteria, Fusobacteria, Archea and Verrucomicrobia. The intestinal microbiome affects the brain by the humoral and neuronal mechanisms with particular attention to the vagus nerve. Signals from the brain may influence sensory, motor, and secretory modalities of the GI tract, and signals from the GI tract influence brain functions. Burgeoning literature suggest that microbiota has direct and indirect influence on pathogenesis of neuropsychatric disorders like autism, stress and Anxiety depression, Alzheimer's, Schizophrenia and Bipolar Disorder. The prevalence of mental disorders is predicted to increase and the role of microbiota for our health and in the pathogenesis of diseases is greatly affected by gut microbiota. Multiple studies, with antibiotic and probiotic treatments, fecal microbiota transplantation, and GF animal studies have been used to assess the impact of microbiota on brain function demonstrating differences between healthy human gut microflora composition and that of patients with neuropsychiatric diseases. It is well known that gut microbiota composition and functioning depends largely on diet, which consequently can affect also nervous system and metabolism. Exploring of the signaling pathways between the microbiota and the brain in humans is needed to expand our understanding of microbiota gut–brain interactions. Also modulation of the gut microflora can be a novel target for the prevention and treatment of neuropsychiatric disorders.

Keywords: Microbiome, Neuro psychiatric Disorder, autism, Stress and Anxiety depression, Alzheimer's, Schizophrenia and Bipolar Disorder

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RESVERATROL: A SOLUTION FOR ALZHEIMER AND DIABETES

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Abstract: Resveratrol is a phytoalexin compound produced by plants on the occurrence of any injury. It is a secondary metabolite which can be used for the treatment of various diseases. Mainly present in the food materials like peanuts, blueberry, cranberry etc. It has antitumor, antidiabetic and anti-obesity activity. There are several ways in which Resveratrol can be used for the treatment of major diseases i.e. Alzheimer and Diabetes. Alzheimer is a disease which leads to the loss or destruction of memory because of the accumulation of Amyloid between the nerve cells. Amyloid formation causes inflammation in Alzheimer disease which leads to the death of normal neurons. Resveratrol effect the MCP-1 expression in an adverse way which leads to the relief in the inflammation in Alzheimer. Diabetes is a most common disease which mainly causes the change in the blood sugar level of the body. Broadly classified into two types i.e. Type 1 and Type 2 whereas in the first one there in no production of insulin, Resveratrol decrease the blood sugar level on the other hand in Type 2 Resveratrol effect both insulin action and pancreatic beta cells when there is no effect on insulin. Not only in these two diseases beneficial effects of Resveratrol can also be seen in curing skin related problems and weightloss.

Keyword: Resveratrol, Diabetes, Alzheimer

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ROLE OF HYPEROXALURIA AND CALCIUM OXALATE CRYSTALS IN UROLITHIASIS

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Abstract: Increased dietary intake and increased intestinal absorption of oxalate from the diet, or an increased endogenous production of oxalate result in the condition called hyperoxaluria. Renal tubular fluid is supersaturated with calcium and oxalate ions, which tend to form calcium oxalate monohydrate crystals (COM). Calcium oxalate is the major component of about 75% of all urinary stones. COM crystals adhere to renal epithelial cells and initiate the pathogenesis of urolithiasis. Exposure to oxalate and COM crystals reportedly increase the expression of MCP-1(monocyte chemoattractant protein-1) mRNA leading to up regulation of MCP-1 protein. MCP-1 is known to be an important chemokine associated with inflammatory response and various pathological abnormalities related to renal epithelial cells. In vitro lithogenic crystals induce ROS generation in renal tubular cells leading to oxidative stress, cell injury and release of inflammatory mediators. Renal cell damage is primarily due to hyperoxaluria and is augmented by crystal deposition in the renal tubules. When reactive oxygen species (ROS) are produced in excess and endogenous antioxidants are imbalanced, excessive ROS directly attack cellular biomolecules, cause tissue injury and eventually lead to pathogenesis. Products of cellular degradation act as nuclaetors of calcium oxalate crystallization and elevate the problem. Studies reveal that intervention with antioxidants efficiently reduces oxidative damage and crystal deposits. In conclusion, exposure to oxalate and COM crystal adherence increases renal cellular susceptibility to lipid peroxidation and an imbalance in endogenous antioxidants along with alteration in gene expression leading to the formation of renal calculi.

Keywords: Urolithiasis; Crystallization; Supersaturation; Oxidative stress

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MICROBIAL SYNTHESIS OF NANOPARTICLES AND ITS ROLE IN AGRICULTURE

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Abstract: Nanoparticles are those materials that are minute enough to fall in the nanometric range, with at least one of their size being less than a few hundred nanometres. When compared to chemical fertilizers requirement and cost of nanofertilizers are economically cheap and are required in smaller amount. Since 40-70% of nitrogen, 80-90% of phosphorus, and 50-70% of potassium of the fertilizers is lost to the environment and can't be absorbed by targeted plants causing loss therefore nanostructured fertilizers can increase the nutrient use efficiency through mechanisms such as targeted delivery, controlled release thus improve crop productivity by enhancing seed rate germination, seedling growth, photosynthetic activity, nitrogen metabolism, carbohydrate and protein synthesis.Microorganisms, including bacteria (such as actinomycetes), fungi, and yeasts, have been studied extracellularly and intracellularly for the synthesis of metal nanoparticles.The objective of our study is to explore and isolate bacteria for biological synthesis of silver nanoparticles either intracellularly and extracellularly or both. We have taken soil samples from different places viz. fields in and around Amity University, from Nanital and Pachmarhi to get the diversity of microorganisms. We have isolated 16 bacteria from all these samples. All bacterial strains were used for the synthesis of silver nanoparticles. Different concentrations of silver nitrate (10mM, 15mM and 25mM) were taken for the synthesis of nanoparticle. Out of 16 isolates only three have shown intracellular synthesis of silver nanoparticles at all the concentrations. Further experiments like controlling different parameters, incubation time, temperature and response towards certain heavy metals are also being carried out.

Keywords: Nanofertilizers, Nanoparticles, Microbes, Agriculture, Intracellular, Extracellular.

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ANIMAL MODEL OF HEPATOCARCINOGENEIS : FIRST STEP OF BIOMARKER SEARCH FOR EARLY IDENTIFICATION OF HEPATOCARCINOMA.

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Abstract: Hepatocellular carcinoma is a multistep, complex process with poor prognosis. It is one of the major causes of cancer related death due to its late diagnosis and treatment. With the advance in understanding of tumor biology along with advance development of cellular and molecular techniques, the role of biomarkers related to early detection, invasiveness, metastasis and recurrence has increased the interest of research.In present poster I want to present my work including preliminary step like establishment of animal model and livermarker enzymes (GGT & AchE) assay and other marker protein like AFP and other cytokines assay(IL2, IL4 etc) levels which were measured using a commercial enzyme-linked immunosorbent assay (ELISA) kit & Western Blot.

Keywords: hepatocellular carcinoma; gamma-glutamyl transpeptidase; acetylcholin esterase; biomarker

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EVALUATION OF ANTI-PLASMODIAL ACTIVITIES OF SELECTED MEDICINAL PLANTS EXTRACTS

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Abstract: Malaria is an infectious disease caused by Plasmodium parasite and is transmitted between humans by Anopheles. It is a global health concern as severe infection of malaria due to P. falciparum is life threatening. Elimination of malaria has become a major challenge as parasite is developing resistance against currently available drugs which prompts the identification and evaluation of new and effective drugs. The fact that quinine and artemisinin (compounds with successful antimalarial activity) have been derived from Cinchona and Artemisia respectively indicates that traditional herbs could provide a range of promising remedies against malaria. In this context, leaves of 30 medicinal plants were extracted using methanol and were tested against Plasmodium falciparum strain 3D7 [chloroquine (CQ) sensitive] using florescence based SYBR-Green assay. Two extracts showed promising activity (IC50 <10 g/ml), four showed good activity (IC50: 11–25 g/ml), thirteen showed moderate activity (IC50: 26–50 g/ml), seven extracts showed poor (IC50 51-100 µg/ml) and four were inactive (IC50 >100 µg/ml). The extracts with significant activity against CQ sensitive strain (IC50: <10 - 50 µg/ml) were further found equipotent to CQ-resistant INDO strain with resistance index ranging 0.4- 2. These extracts were found relatively non-toxic to mammalian cell lines when assessed for cytotoxic effects using HEK293 cell lines. On the basis of resistance and selectivity indices, selected extracts in their crude forms were assayed for oral activity in P. berghei mouse model in a 4-day suppressive test and were found to suppress P. berghei parasitaemia significantly. These potent extracts would further be fractionated on normal and reverse phase chromatography which may lead to enrichment in activity in some of fractions.

Keywords: Medicinal Plants, Anti-plasmodial, Drug resistance, SYBR-Green assay, Mammalian cell lines

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GUT-SKIN AXIS: GUT MICROBIOME AS REGULATOR OF SKIN HEALTH

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Abstract: Human gut comprises of a plethora of microbes which are essentially a diverse group of bacteria residing predominantly in the lower gut and maintaining a symbiotic balance with the human habitat. The intestine and the skin are both vital interface organs having many similarities and intestinal diseases have manifestations of symptoms on the skin. However, the detailed mechanisms behind this phenomenon remain largely unexplored since a comprehensive research into the gut-skin axis is still in its nascent stage. The various mechanisms by which the gut and skin might display interactions during pathological state or under normal physiological conditions need to be explored. The gut-skin axis functionality largely involves and is dependent upon the dietary components of the host which regulates the metabolic activities of the intestinal microbiome. The skin provides access to metabolites from dietary compounds or gut microbiota. A thorough research and understanding of properties of these metabolites, their interaction with the environment and the alterations induced by them on skin, will aid in the development of novel methods of therapy to be applied on one organ in prophylaxis of the other. In this review, the most recent advancements in our understanding of the intestinal microbiome and its interaction with the skin essentially as an important regulator of the gut-skin axis, has been primarily discussed. This communication can be further explored to study its influence on skin during differentiation and process of keratinization and for the modulation of dermatological immune response involved in disease conditions. Moreover, the knowledge of mechanism of this communication link can be utilized to regulate various dermatological conditions. Therefore, with the aid of current progress in the research involving the gut-skin axis as well as communication bridge between the two organs, clinical advancements of therapeutic processes can be made possible in the near future.

Keywords: Diet, Gut Microbiome, Gut-Skin Axis, Probiotics.

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EFFECTS OF HORMONES ON FOOD INTAKE

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Abstract: A hormone is any member of a class of signalling molecules produced by glands in multicellular organisms that are transported by the circulatory system to target distant organs to regulate physiology and behaviour. Food intake is the ingestion of any substance consisting of carbohydrates, proteins, fats, vitamins and minerals. The intake of food is very important as it provides energy, promotes growth and maintains life of an individual. Numerous circulating peptides and steroids produced in the body influence appetide through their actions on the hypothalamus, the brain stem, and the autonomic nervous system. These hormones come from three major sites- fat cells, gastrointestinal tract, and the pancreas. One of its most important hormones is leptin, a peptide hormone with numerous actions, including influences on energy homeostasis and neuroendocrine and immune function. The pancreatic hormone, insulin is also one of the first adiposity signals to be described and, like leptin, is positively correlated with long-term energy balance. Ghrelin is the endogenous agonist of the growth hormone secretagogue receptor (GHS-R) and a potent orexigenic factor. It is produced and released primarily by the gastric oxyntic cells; however, total gastrectomy only reduces plasma ghrelin by 50–60%. Hence, the regulation of eating is tuned by many neural and hormonal signals from the gastrointestinal tract, liver, adipose tissue, and from several parts of the brain. The hypothalamus has a key role in the regulation of food and fluid intakes, but higher levels of the brain, such as the cortical areas, are also involved in determining what people eat.

Keywords: Leptin, Insulin, Ghrelin, Growth hormone secretagogue receptor

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PHYTOESTROGEN: FOOD OR DRUG?

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Abstarct: The physiologic and pharmacologic role of bioactive compounds present in plants has increased dramatically over the last decade. The phytoestrogens are the bioactive molecules that are present as nutritional constituents of widely consumed vegetables. Their name is derived from the fact that they are able to bind to estrogen receptors and to induce an estrogenic/antiestrogenic response in target tissues. Natural estrogens are involved in a multiplicity of programmed events in target tissues such as uterus, breast, pituitary gland and hormone responsive tumors. Phytoestrogens are present in many foodstuffs including fruits (plum, pear, apple, grape berries), vegetables (beans, sprouts, cabbage, spinach, soybeans, grains, hops, garlic, onion), wine, tea, and they have been identified in a number of botanical dietary supplements. In relation to human health are the classes of compounds known as the phytoestrogens, which embody several groups of non-steroidal estrogens, including isoflavones and lignans that are widely distributed within nature. A litany of health benefits that are including a lowered risk of osteoporosis, heart disease, breast cancer and menopausal symptoms, are frequently attributed to phytoestrogens. Estrogen level begin to decline with a wo man's age and resulting in the end of menstrual cycle which results in menopausal symptoms, including hot flashes, urogenital atrophy, incontinence, insomnia, heart problems and osteoporosis. These may compete with endogenous mammalian estrogens, bind to the ER and prevent estrogen-stimulated growth in mammals. These come into focus of interest due to their positive effects in prevention of hormone dependent cancer, cardiovascular diseases by improving plasma lipid concentrations, osteoporosis and cognitive decline.

Keywords: Phytoestrogen, Isoflavanol, Estrogen, Osteoporosis

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IDENTIFICATION OF HOST INTERACTORS OF CHIKUNGUNYA VIRUS NON-STRUCTURAL PROTEIN 1

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Abstract: Unavailability of vaccine against Chikungunya virus (CHIKV) raises an alarming threat worldwide. CHIKV is an enveloped re-emerging mosquito borne alphavirus. Viruses perturb the host cellular machinery via host-virus protein interaction and establish complex network. These networks are crucial for viral replication and dissemination of the infection so there is an emergency to exploit these interactions. Non-structural protein 1 (nsP1) of CHIKV act as a viral capping enzyme during replication and believed to be involved in the attachment of replication complex with the host membrane and hence have an important role in the viral pathogenesis inside the host cell. The cellular interactors of nsP1 of CHIKV were identified via screening of normalized universal human cDNA library by exploiting high-throughput yeast two hybrid technique. Initially approximately 400 were obtained which were further screened on the basis of stringent interaction. Finally 7 cellular interactors were indentified, belonging to the transcriptional factor, in vesicle trafficking pathways and ubiquitin (Ubl) conjugation pathway. These interactors will be further validated by pull down assays.

Keywords: Chikungunya, non-structural protein, yeast two hybrid, cDNA library.

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THERAPEUTICS AGAINST CHIKUNGUNYA VIRUS

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Abstract: Chikungunya virus (CHIKV) is avector-bornere-emerging arbovirus belongs to alphavirus genus of the Togaviridae family. The persistent illnessistransmittedthroughthebite offemalemosquito.Ithasevolvedfromageographicallyisolatedpathogentoavirusthatiswidespreadin many parts of Africa, Asia and some regionof Central and South America. The CHIKVinfectionisusually associatedwithfeverandpolyarthralgia,anditisrarelyfatal.This chronic CHIKV infection can severely incapacitate patients for weeks up to several years after the initial infection. Currently, there are no licensed vaccines or therapies available against CHIKV. Therefore the treatment is on basis of symptoms and consists of administration of analgesics, antipyretics, and anti-inflammatory agents.The development of formidable and safe antivirals for prophylaxis and treatment of CHIKV infections is urgently needed. The most promising antivirals so far discovered are reviewed, with a special focus on virus-encoded replication proteins as potential targets. Wehave also emphasized the various strategies that are unique in the vaccine field against chikungunya.

Keywords: Chikungunya; Antiviral; Alphavirus; Polyarthralgia

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PROBIOTICS: THE GOOD BACTERIA OF HUMAN GUT

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Abstract: Probiotic products have been used worldwide. Probiotics are significantly gaining attention and their consumption is associated with several health benefits and availability in the form of dietary supplements and food Products. Consumers are becoming more conscious about food which could enhance the immunity and reduce the medical incidences in their life. Probiotics are defined as live microorganisms that are known to have a beneficial effect in the prevention and treatment of specific pathologic conditions when they are ingested. Currently, the best-studied probiotics are the lactic acid bacteria, specifically Lactobacillus sp. and Bifidobacterium sp. Probiotics helps in prevention and treatment of a diverse spectrum of gastrointestinal disorders such as antibiotic-associated diarrhea, infectious bacterial and viral diarrhea, Helicobacter pylori infection, inflammatory bowel disease, and lactose intolerance. Probiotics also play important role in inhibition of intestinal bacterial enzymes involved in the synthesis of colonic carcinogens. Other important actions are also reported such as the control of the intestinal microbiota, decrease of the pathogens count by the production of lactic acids, bacteriocins and other antimicrobial compound forms, prevention or suppression of colon cancer, reduction of cholesterol, and improvement of allergic conditions and treatment of the respiratory tract. There are different probiotic products have appeared in market with different formulations and applications. The future of probiotic foods is even promising, as modern consumers are worried to maintain their health, and expect the food that they eat to be healthy and capable of avoiding illness.

Key words: Probiotics, Lactobacilli, Bifidobacteria, Gastrointestinal disorders, Health benefits, Probiotic products

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VIRAL INFECTIONS IN ADULTS FOLLOWING HEMATOPOIETIC STEM CELL TRANSPLANT

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Abstract: Hematopoietic stem cell transplant (HSCT) recipients are at a significant health risk of respiratory viral infections leading to severe disease and mortality. In this study, a cohort of 55 HSCT patients with respiratory illnesses was tested for viral etiologies over 16 months period (Aug 2017- Nov 2018) in the virology laboratory, Department of Microbiology, AIIMS, New Delhi.Real time PCR based detection and characterisation was performed for 6 respiratory viruses namely Influenza virus, Respiratory syncytial virus (RSV), Adenovirus, Rhinovirus, Human metapneumovirus (HMPV) and Parainfluenza virus (PIV). Further sub-typing was also done for Influenza virus, RSV and PIV.A total of 165 episodes of suspected respiratory infections were recorded in 55 patients, of which 70 samples were collected and tested; this included 15 patients with two episodes of respiratory illness over the follow-up. 29 (41.4%) of the 70 samples tested were positive for one or the other respiratory viruses: 4(5.71%) Influenza A H3N2, 01(1.4%) Influenza B, 02(2.85%) RSV B, 01(1.4%) PIV4, 18(25.71%) Rhino Virus and 3(4.28%) HMPV. Of these, sixteen (55.1%) respiratory viral infections occurred within the first month post-HSCT. Rhinovirus was the most common virus (12/16) detected during the first month, followed by one each of Influenza B, RSV-B, PIV-4 and HMPV. As HSCT patients are expected to be more prone to severe viral infections during the early phase of transplant, an early detection may facilitate prompt management and thus prevent mortality. Unvaccinated or exposed health care personnel should be advised to take precautions to minimise the risk of spread of nosocomial transmission.

Keywords: Hematopoietic, respiratory infections, nosocomial.

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EFFECTS OF AMOXICILLIN ON PLANT METABOLITES

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Abstract: Extensive worldwide use of antibiotics has resulted in significant pollution of the environment, but understanding the effects of many important antibiotics on plant physiological and chemical activity is still not explored much, especially at realistic environmental concentrations of antibiotics. Vigna radiata was grown in different concentration of amoxicillin for three weeks. These plants could grow under presence of amoxicillin and showed the presence of amoxicillin in roots, shoots and leaf parts of plants. Amoxicillin showed interaction with plant primary and secondary metabolites and also degradation of these compounds. Amoxicillin concentration was analyzed by spectrometry method. Toxic effects of amoxicillin on Vigna radiata were reflected by the reductions in photosynthetic pigments, primary metabolites, and secondary metabolites. To gain insight into influence of antibiotics on plant performance and assess toxicity various metabolites were evaluated. The study concluded that impacts of amoxicillin on plants.

Key Words: Amoxicillin, Plants, Primary metabolites, Secondary metabolites

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CANCER IN INDIA WITH GLOBAL COMPARISON: PRESENTING DATA FROM IARC-WHO

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Abstract: IARC-WHO has developed 'CANCER TODAY', a database of 'incidence', 'mortality' and 'prevalence' of cancer in 185 countries/territories. Comparative analysis and identify sex-wise chief cancer-types globally and in India. Downloading data and generating relevant tables in Python. Breast, lung and stomach cancer incidences are common among top-five cancer types reported globally and in India. However, in India lip-oral cavity and cervix-uteri cancer incidences are more than colorectum and prostate cancer those appear in top-five global-list. Respectively 211 & 77 cancer incidences per-lakh-population are reported globally and in India; showing that appearances of new cancer cases in India is unrelenting. Mortality and incidences in India are for same cancer-types. But, globally breast cancer incidences are higher than mortalities. Mortality-Incidence (MI) Ratios of cancer for globe and India are respectively 54.9% & 68.7%; revealing high cancer deaths in country. Instead of lung and stomach, prevalence in India is reported for colorectum and leukaemia apart from other three major cancer-types. Though globally prevalence of thyroid cancer is reported, low incidence and mortality indicates its efficient cure and prevention. However, global spur in stomach cancer is reported. There are 484 & 152 cancer prevalences per-lakh-population globally and in India; expressing prevalence of cancer in India is unrelenting. Major five cancer-types in India contribute around 49% of incidences, 47% of mortality and 54% of prevalence. Besides age, high rate of fasting plasma glucose and inhaling second hand smoke are leading causes of breast cancer, whereas lip-oral cavity cancers in India are mainly caused by tobacco, alcohol and smoking. Analysis reflects that MI Ratio in India is high. Hence, expanding cancer care and treatment facilities duly learning from global experiences is needed. However, cancer prevalence is unrelenting in India.

Keywords: cancer incidence, mortality and prevalence, MI Ratio, IARC-WHO

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APPLICATIONS OF CHITOSAN IN COSMETICS AND COSMECEUTICAL INDUSTRY

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Abstract: Chitosan is a naturally occurring polysaccharide composed of N-acetyl glucosamine and glucosamine units, which is derived from exoskeleton of crustaceans. Chitosan and its derivatives are of great importance to cosmetic and cosmeceutical industry due to their unique physicochemical properties such as bio-compatibility, bio-degradation, bioadhesivity and non-toxicity. Carboxy-methyl chitosan and chitin have extracellular matrix polysaccharides in common along with water solubility, anionic functionality, high viscosity, large osmotic pressure, and gel forming probabilities, suggesting their suitability as a candidate for skin care and hair care ingredients. They are known to interact with keratin, forming a thin, transparent film over hair fibres and increases hair strength, texture and avoid hair damage. Main functions of chitosan in skin care preparations include skin conditioning, cleansing, skin protection, antioxidant, emollient, UV protectant, anti-microbial and humectants. This review summarizes the possible applications of chitosan and its derivatives in skin care, hair care and oral healthcare and commercial preparations available.

Keywords: Chitosan, Chitin, Anti microbial, Cosmetic, Skin care, Hair care

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APPLICATION OF CHITOSAN IN FOOD PRESERVATION AND PACKAGING

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Abstract: Chitosan is a natural polymer that is a derivative of chitin, obtained from various marine sources and fungi. With the increased understanding of chitosan's properties in recent times, there is an increased demand for chitosan derived products in the market. Chitosan is more versatile due to its reactivity and solubility. Chitosan and its derivatives have been used in food industry as it is non toxic, biocompatibility and can be used alone or blended with other polymers. Chitosan possesses unique biological properties such as antimicrobial, antifungal, and antibacterial activities and thus has a proposed use in food preservation. Chitosan and its derivatives have been used as packaging films for food preservation, minimizing weight loss, delayed the ageing signs, prevention of waster loss and retention of texture and color of the fruits and vegetables. Anti- microbial activity of chitosan and its derivatives limits the growth of microorganisms which supports the applications of chitosan in food packaging and preservation Chitosan and its blend membranes/films are reported to enhance the antioxidant and antimicrobial activities effectively, at the same time giving an attractive appearance to the product that is the most important factor influencing the nutrient quality of the food.

Keywords: Chitosan, Food preservation, Anti-microbial, Antioxidant, Packaging

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PRODUCTION OF BIOETHANOL FROM INVERTASE IMMOBILIZED ON CHITOSAN USING GLUTARALDEHYDE OR TRIS(HYDROXYMETHYL)PHOSPHINE AS CROSS-LINKING AGENT

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Abstract: Invertase, an intracellular hydrolytic enzyme, catalyzes the breakdown of sucrose into fructose and glucose. Enzyme immobilization refers to the physical confinement of enzyme in a certain region of space with retention of its activity and repetitive usage providing economical benefits. In this study, commercially available invertase from Saccharomyces cerevisiae was covalently immobilized onto chitosan which is an amine functionalized support. To maintain the structural and functional property of enzyme during immobilization, cross-linking reagents are used. In this work, both glutaraldehyde and tris(hydroxymethyl)phosphine (THP) were compared as cross-linking reagents. Glutaraldehyde, apart from being toxic in nature, auto-polymerises on storage resulting in variable composition. Moreover, the carbon-nitrogen bond formed in the coupling reaction with glutaraldehyde is prone to hydrolysis. In comparison to glutaraldehyde, the P-CH2-N linkage formed in the case of water soluble THP, is less prone to hydrolysis resulting in improved thermal and pH stability which facilitates the use of THP as an alternative cross-linking reagent. THP immobilized invertase showed higher enzymatic activity as compared to both the free enzyme and glutaraldehyde immobilized enzyme, resulting in higher yield of glucose. Both the immobilized invertase preparations showed good tolerance to the variation in solution pH and temperature among which THP activated immobilized invertase was better. After optimization of the enzymatic parameters for sucrose hydrolysis, THP immobilized invertase was chosen for the production of bioethanol using a nutritious liquid growth medium for the cultivation of yeast. Fermentation in the presence of immobilized invertase at 30 C,° pH 3.5 resulted in enhanced ethanol yield.

Keywords: Invertase, Bioethanol, Immobilization, Chitosan, Glutaraldehyde, Tris(hydroxymethyl)phosphine

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BIOAVAILABILITY: AN IMPORTANT FACET OF INTRANASAL DRUG DELIVERY SYSTEM

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Abstract: Advent of biotechnology and pharmaceutical sciences when blended together for endogenous protein and peptide molecules together for therapeutic application, exhibit vast array of intranasal drug delivery potentiality. Intranasal drug delivery system (INDDS) provides remunerative way of drug delivery to both topical and systemic therapies which is even more useful for the delivery of drugs that are active even in lower dosage form. Due to the higher nasal mucosa permeability with larger surface area, nasal route allows the rapid onset of therapeutic relief, replicating the high end advantages of intravenous administration and added benefits of being non invasive and highly patient compliant. Though this targeted route shows enormous advantages, the bioavailability of the loaded formulations is still questionable as it is limited by various biological, physiochemical and permeability concerns. Therefore, this study focuses on the various formulation strategies adopted or are in the process of acceptance to overcome the mentioned obstacles. We have critically analyzed various approaches such as incorporation of permeation enhancers in developed formulation, receptor inhibitors, mucoadhesive, prodrug installations, PEGylation etc. for improving the bioavailability of nasal formulations and inhibiting the side effects.

Keywords: bioavailability, intranasal drug delivery.

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INTRANASAL CORTICOSTEROIDS FOR ADULT AND PAEDIATRIC USAGE

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Abstract: Intranasal corticosteroids (INC) are cortisone-like medicines belonging to the family of steroids, used in many clinical conditions. They are the most acclaimed and effective first line treatment options available for allergic rhinitis, repeated allergic sneezing, rhinorrhoea, nasal congestion, itching and blockages. They also proved to be very effective in preventing nasal polyps from growing back after they have been removed by surgery. Several commercial formulations for intranasal corticosteroids are available namely - beclomethasone dipropionate, budesonide, flunisolide, etc. to treat the above mentioned conditions in the form of nasal spray. Allergic rhinitis is a common problem in childhood and adolescence and thus, the treatment given in these age groups needs to be more patient compliant and intranasal delivery of corticosteroids for curing such allergic conditions has proved to be more efficacious than other pharmaceutical options available. The advantage of INC in allergic rhinitis condition is that the adequate drug concentrations can be achieved at receptor sites in nasal mucosa which leads to instant symptomatic control and reduces the risk of systemic adverse effects. Our study is focussed on various perspectives of INC usage in adults and paediatric subjects, emphasising on its pharmaceutical efficacy and targeted delivery to the pathological sites.

Key words: Allergic rhinitis, Steroids, Nasal polyps, Rhinorrhoea, Targeted delivery, Nasal mucosa.

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USE OF PHARMACOGENOMICS TO TAILOR CANCER THERAPEUTICS

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Abstract: Cancer is the leading cause of death globally, and is responsible for an estimated 9.6 million deaths in alone 2018. About 1 in 6 deaths is due to cancer. Although a variety of treatments are available for curing Cancer such as Chemotherapy, Radiation Therapy and Immunotherapy but they also carry certain side effects which can further deteriorate patient's condition. Additionally the difference in genetic make of different also becomes a challenge for common treatment for a cancer type. We also know many of the cancer patients are genetically predisposed such as the mutations in BRCA genes are commonly associated with breast cancer. Hence it is imperative to promote the use of pharmacogenomics to develop certain tailoring therapeutics based on an individual's genetic makeup, repurposing medications and rational drug development.With the development of Precision Medicine, we can understand whether the patient can handle a particular medicine by performing Genetic profiling, develop therapies and use the drugs approved by FDA that target specific tumor cells.Different therapeutic approaches are required for molecularly distinct subtypes of cancers. The use of the monoclonal antibodies (trastuzumab and cetuximab) in HER2-positive breast cancer and tyrosine kinase inhibitors (gefitinib, crizotinib, imatinib and erlotinib) in chronic myeloid leukaemia and lung cancer are examples that emphasise on the role of personalized medicines in cancer treatment. Finally, we focus on advances, challenges and future perspectives of personalized medicine in cancer.

Keywords: Cancer, Precision Medicine, pharmacogenomics, gene mutation

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PRODUCTION AND CHARACTERIZATION OF FUNGAL CHITOSAN FROM TRICHODERMA LONGIBRACHIATUM

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Abstract: Chitosan is a natural polymer composed of N-acetylglucosamine and glucosamine units. Chitosan is commercially isolated from crustacean shells using chemical extraction, which yields chitosan with varying physic-chemical properties. However, due to seasonal availability of raw material, and in-consistency in yields and purity of chitosan, production of fungal chitosan from microbial sources has gained interest in the recent years. This study focuses on comparative analysis of fungal chito-san obtained from Trichoderma longibrachiatum (ITCC 7839), cultivated in two different culture media, Yeast Extract Peptone Dextrose Broth (YPD) and Potato Dextrose Broth (PDB), in sub-merged fermentation for 5 days. Fungal chitosan was extracted from the fungal biomass using alkali treatment process and was air dried. The yield of fungal chitosan extracted from YPD and PDB was found out to be 0.627 mg/ml and 0.907 mg/ml respectively. Degree of deacetylation of fungal chitosan extracted from YPD and PDB was 69% and 71% respectively, in comparison to 79% for commercial chitosan. Fungal chitosan was further characterized for physico-chemical properties using FTIR. This study suggests that fungal chitosan can also be a promising source for chitosan production and can be used for commercial production of the polymer.

Keywords: Fungal chitosan, Degree of deacetylation, FTIR, Trichoderma, Submerged fermenta-tion,

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ICABB-099

ANTI-PROLIFERATIVE EFFECT OF NARINGENIN IN HUMAN GLIOBLASTOMAS MULTIFORME CELL LINE

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Abstract: GBM is a lethal and most common in brain tumours with poor outcome. The current standard drug usedfor the treatment of GBMis Temozolomide (TMZ). The patients with GBM have 10 to 15 months of medial survival along with treatment still there is no improvement in overall survival. Naringenin is known as a flavonoid, generally found in grapefruit and having antioxidant, anti-inflammation properties. It has also been reported as an anti-cancer agent in human colorectal cancer cell linesand lung cancercell lines. However, the actual mechanism by which naringenininhibits anti-cancer properties still remains unknown.We investigated the anti-cancer properties of Naringenin in human GBM cell lines. We observed the anti-proliferative effect by using 3-4,5-dimethylthiazol-2-yl-2,5-diphenyltetrazolium bromide (MTT) assay,the morphological changes of cells by using nuclear morphology assay. The effect of Naringenin on cell migration was investigated by using wound healing assay and the self-renewing effect of cells was investigated by using soft-agar assay. Our results showed that Naringenin inhibits the growth of cells, cell migration and self-renewing capacity of cells in GBM cell lines. To conclude, Naringenin could be a possible anti-cancer phytotherapeutic for the treatment of GBM.

Keywords: Anti-proliferation; Cell migration;MTT; phytotherapeutic

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AN INSILICO CHARACTERIZATION OF NLPC/P60 (RV2190C), A PROTEIN HYDROLASE OF MYCOBACTERIUM TUBERCULOSIS

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Abstract: Mycobacterium tuberculosis (Mtb) H37Rv is a pathogenic bacteria which causes tuberculosis. The rise in MDR (Multidrug resistance) and XDR (Extensively drug resistance) strains made the situation more severe. The sturdy cell wall of M. tuberculosis prevents passage of nutrients into and excreted from the cell, consequently giving it the attribute of slow growth rate. Mycobacterial cell envelope enhances pathogenicity. The cell envelope consists of peptidoglycan that is covalently linked to the arabinogalactan through a bond called the phosphodiester. Hydrolyses of peptidoglycan is by a varied set of enzymes during bacterial growth, development and cell division. The NlpC/P60 protein family define a domain of cell-wall peptidases that are broadly represented in diverse bacterial lineages. The key function of NlpC/P60 domain is the peptidoglycan lytic activity. The Rv2190c gene is depicted as a ''hypothetical protein'' containing an NlpC/P60 domain and involved in cell wall maintenance and composition and is necessary for standard growth and virulence in vivo, and is also expressed as possibly surface exposed and immunogenic in the mammalian host. The in-silico characterization studies of Rv2190c includes identification of structural homologs with maximum sequence similarity, evolutionary relationships between Rv2190c of Mycobacterium within different strains of Mycobaterium and with the other pathogenic microorganisms. The other important aspect is the secondary structure prediction of the protein (Rv2190c) and Rv2190c has not been previously crystallized. Putative binding sites were identified using CASTp server. In order to further understand the interaction of the Rv2190c with ligand molecules and protein-protein interaction, docking analysis was done using HDock server. The future prospects of the in-silico characterisation of protein is to aid in speeding up the research work for designing small inhibitory molecules, mutational studies and kinetic characterization.

Keywords: MDR, XDR, peptidoglycan, NlpC/P60, Rv2190c, secondary structure, docking analysis

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NANOTECHNOLOGICAL IMPETUS TO VACCINE DEVELOPMENT

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Abstract: Development of vaccine played a major role in the prevention and eradication of infectious diseases. The success story of vaccination so far relies mainly on the use of traditional vaccine such as live attenuated or killed vaccines. Despite the success achieved with traditional vaccine, reverting back to its infectious form and its instability are the limitations of these vaccine. Therefore, the focus of vaccine development is mainly on subunit vaccine such as DNA or protein vaccine which are purer, safer and easier to produce. These vaccine produce both humoral and cellular mediated immunity but are poor immunogen and require adjuvant for immunogenicity. There are only few adjuvants which are licensed for human use, however, the drawbacks associated with these adjuvants necessitate the search for newer adjuvant and delivery vehicle for subunit vaccine. Recently, research interest has shifted to nanoparticles as adjuvants and/or delivery vehicle. A detailed discussion of different nanoparticles
- polymeric nanoparticle, metallic nanoparticles employed for vaccine developmentand their role and impact.

Keywords: Nanoparticles; Vaccine; Adjuvants; Delivery vehicles

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EXPLOITATION OF NANOTECHNOLOGY TO ACHIEVE COST EFFECTIVE SOLAR CELLS

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Abstract: With exponentially rising demand of energy and resources thereof, solar energy seems to be the most promising and viable alternative source. India's electricity demand, which was 876 Terra Watt-hour (TWh) in 2012 is expected to rise up to 5518 TWh by 2047 and fossil fuels are unable to meet the increase in energy demand effectively. Out of various renewable sources, solar energy has proved to be the best alternative available today as it is both renewable and eco-friendly. This review presents a critical analysis of solar cells, their market demand and cost dynamics. Among different types of solar cells, Dye-sensitized solar cells (DSSCs) and recent technological advancements of DSSCs has been dealt with in detail. Nanotechnological revolution has also effected the field of solar cells and especially, DSSCs. Though DSSCs are low-priced photovoltaic devices in comparison to other solar cells, however, dyes used in DSSC have several limitations such as rarity, high cost and complexity to be used on commercial scale. This created the need to shift the focus to Bio-solar cells that use natural dyes owing to high abundancy, low cost and environment friendliness. Biosolar cells seem to be a promising alternative, however, as-of-today, the solar-to-electrical conversion efficiencies recorded for bio- solar cell are lower than first and second generation solar cells. Hence, there is a need to have concerted efforts, exploiting nanotechnology and alternate biological dyes for increasing the efficiency.

Keywords: Nanotechnological; solar energy; Terra Watt-hour; DSSC

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NANOENCAPSULATION OF ESSENTIAL OILS TO TREAT ANTIMICROBIAL RESISTANCE AND NUTRIENT MANAGEMENT IN AGRICULTURAL PRACTICES

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Abstract: World-wide scientists are trying to provide clean and safe environment by adapting green technologies. Considering the overall advantages of nanomaterials, investigators suggest the application of various sustainable agriculture spheres as a result of agri-nanotechnology which is beneficial to fulfill the challenges of targeted delivery of pesticides and insecticides, promote seed germination and plant growth, increase crop yield, improve food quality, management of pestiferous insects that destroy crops and products in the crop lands and fields. Widespread use of artificial agrochemicals in crop protection has led to serious issues of environmental contamination. In an effort to develop bio-based and non-synthetic alternatives, nanobiotechnologists are trying to find out plant based products that possess natural antimicrobial, antifungal and antibacterial properties. With only a few exceptions, bio pesticides and insecticides in commercial use, utilized in traditional practices for a minimum of 150 years and sometimes for much longer. There is essential urge to focus the agricultural research towards finding effective and plant based products against microbial, insects and pests infiltrations. Consequently, essential oils extracted from plants are used for centuries to guard and preserve the commodities or to repel pests from human habitations. They have a protracted history of human uses excluding pest control, notably as fragrances, flavourings, condiments or spices, additionally as medicative uses. Plant essential oils are obtained from plant parts of terrestrial plant families which includes mint (Lamiaceae), myrtle (Myrtaceae), citrus (Rutaceae) and carrot (Apiaceae), pyrethrum and Neem. The best known essential oils with bioactivity against pests are clove oil (eugenol), thyme oil (thymol), mint oil (menthol), lemongrass oil (citronellal), cinnamon oil (cinnamaldehyde), rosemary oil (1,8-cineole) and oil of oregano (carvacrol). This paper focuses on the various reasons to formulate these essential oil varieties in to nanoformulation, their comparative efficacies and their effects on treating the various crop/plant infections and infestations.

Keywords: Nanoformulations, Essential oils, Antimicrobial, Plant infections, Plant infestations.

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HUNTINGTON'S DISEASE AND IT'S TREATMENT VIA CRISPR/CAS9

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Abstract: Huntington's disease (HD) is an autosomal dominant inherited disorder characterized by progressive psychiatric breakdown, cognitive defects, and lack of motor coordination. HD is caused by the presence of an elongated CAG codon repeat (36 repeats or more) on the HTT gene. The onset of the disease depends upon the number of CAG repeats. HD usually causes physical, cognitive and emotional impairments. For developing a treatment for HD, gene therapy techniques have been tested on disease models (mouse in this case). Laboratory mouse models have been developed to simulate the human pathology of the disease. CRISPR/Cas9 is a unique gene editing tool, which allows editing of the desired segments of the genome in the disease model. Cas9 is an enzyme that cuts DNA precisely to restrict/hinder the effect of the excess CAG repeats on the HTT gene, by using a guide RNA complementary to a specific gene sequence. This prevents the gene to produce the toxic protein, that gets accumulated in the brain and cause the damage. In this review, we have discussed about the treatment of HD with the help of the gene editing tool, CRISPR-Cas9.

Key words: CRISPR-Cas9, Huntington's disease, gene therapy, neurodegenerative disorders

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EFFECTS OF ESTROGEN ON HUMANS

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Abstract: Since the inception of global industrialization, steroidal estrogens have become an emerging and serious concern. Worldwide, steroid estrogens including estrone, estradiol and estriol, pose serious threats to soil, plants, water resources and humans. Indeed, estrogens have gained notable attention in recent years, due to their rapidly increasing concentrations in soil and water all over the world. Concern has been expressed regarding the entry of estrogens into the human food chain which in turn relates to how plants take up and metabolise estrogen. It is seen as one of the major concerns in promoting the proliferation of both the normal and the neoplastic breast epithelium causing breast cancer in females and similarly prostate cancer in males. Accumulating evidence suggests that ER signaling is complex, involving coregulatory proteins and extranuclear actions. ER-coregualtory proteins are tightly regulated under normal conditions with miss expressions primarily reported in cancer. Deregulation of ER coregualtors or ER extranuclear signaling has potential to promote metastasis in ER-positive cancer cells. Not much work is done in this field as the effects have come into light recently but the future work might involve more investigations into epigenetic changes, experiments using new models of hormonal dysregulation and other effects on human health and body.

Keywords : Estrogen , breast cancer , prostate cancer , ER signaling , coregulators

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RADIATION THERAPY AND SKIN REACTIONS: MECHANISM AND TREATMENT

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Abstract: With the increase in people suffering from cancer, the modern technology has equipped us with techniques like Radiotherapy. Today, Radiotherapy plays a pivotal role in the survival of cancer patients. Radiation therapy (also called radiotherapy) is the treatment method that uses high doses of radiation to kill cancer cells and shrink tumors. It can have a targeted, powerful effect on tumors that are confined to a specific area. Approximately 60 percent of people being treated for cancer in the United States are undergoing radiation treatment. However, inflammation and oxidative stress (OS) have been shown to be generally associated with radiation-induced skin reactions (RISRs). Inflammatory response and OS interact and promote each other during RISRs. Severe skin reactions often have a great impact on the progress of RT. The treatment of RISRs is particularly critical because advanced RT technology can also lead to skin reactions. RISRs are classified into acute and chronic reactions. The treatment methods for acute RISRs include steroid treatment, creams, ointments, and hydrocolloid dressings, depending on the reaction grading. Chronic RISRs includes chronic ulcerations, telangiectasias, and fibrosis of the skin, and advanced treatments such as mesenchymal stem cells, hyperbaric oxygen therapy, superoxide dismutase, and low-intensity laser therapy can be considered.

Keywords: radiation-induced skin reactions, inflammatory response, oxidative stress, treatment

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AGROBIOTECHNOLOGY IN MODERN ERA

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Abstract: Agricultural Biotechnology is the term used in crop and livestock improvement through biotechnology tools. It represents unique applications of science that can be used for the betterment of society through development of crops with improved nutritional quality, resistance to pests and diseases, and reduced cost of production. Some of the techniques used are, tissue culture and micropropagation, genetic engineering and genetically modified crops, marker-assisted selection, etc. This review surveys the most important and promising contributions of agriculture biotechnology to the development of sustainable, environment-friendly agriculture in today's scenario. Some of the products include rice with higher levels of iron and beta carotene, long life banana that ripens faster on the tree and can therefore be harvested earlier, maize with improved feed value, papaya ringspot virus resistant papaya, tomatoes with high levels of flavonols, drought tolerant maize and wheat, etc. Also, it deals with the recent achievements of genetic technology for the development of new transgenic microbial, plant and animal products and society's take on it.

Keywords: Agricultural biotechnology; genetically modified crops; environment; transgenic.

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NEUROPROTECTIVE PROPERTIES OF LIPOIC ACID

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Abstract: Alzheimer's is a CNS disease and its major symptoms are loss of memory and cognitive capacities. Alzheimer's Disease has two major causative factors, oxidative stress and energy depletion. In the present review, we are focusing on Lipoic Acid as potential treatment option for Alzheimer's disease. Efficiency of Lipoic Acid has been attributed to its antioxidant property and its ROS scavenging ability.Nanotechnology is an upcoming field of science with a lot of scope in various fields. One of the major applications of nanotechnology is in nanomedicine. Various scientific groups have formulated gold and silver nanoparticles comprising of Lipoic acid. These nanoparticles have shown feasibility as a therapeutic adjuvant during treatment. Novel nanocomposites of Lipoic Acid have been obtained through covalent immobilization on the surface of nanoparticles. The results have shown that Lipoic Acid in the form of nanoparticle has increased specificity of interaction and better antioxidant activity. Multiple reports have suggested low cytotoxicity and enhanced antimicrobial activity on various formulated nanoparticles. In a recent study, combinational approach via combining nanoparticles with antioxidants like Rivastigmine have also been designed, tested with enhanced neuroprotective effects.

Keywords : Alzheimer's Disease, Lipoic Acid, Nanotechnology, Nanoparticles.

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PROTEIN STRUCTURAL MODELLING AND MOLECULAR DYNAMICS SIMULATION REVEALED THE STRUCTURAL DIFFERENCES AMONG WRKY DOMAIN-DNA INTERACTION IN PIGEONPEA (CAJANUS CAJAN L.)

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Abstract: Pigeonpea is a protein-rich legume crop with high nutritional quality and contributes to food and nutritional security. The WRKY proteins are the largest transcription factor family playing a crucial role in plant defense response against biotic and abiotic stresses. We have identified a multi-stress responsive WRKY transcription factor gene family in pigeonpea and report the homology based three-dimensional model of WRKY- DNA binding domain (DBD) variants in pigeonpea using AtWRKY1 (2AYD), AtWRKY4 (1WJ2), and AtWRKY4-WBox complex (2LEX) as a template. The generated protein models were evaluated for reliability and accuracy based on qualitative and quantitative parameters. Final model was subjected to comparative binding analysis of WRKY-DBD and its variants with DNA-W-box (a cis-regulatory element) using protein-DNA docking and molecular dynamics (MD) simulation. The DNA binding specificity with WRKY variants was explored through DNA-protein interaction using HADDOCK docking server. The stability and conformational changes of the generated protein-DNA model was examined through atomistic molecular dynamics (MD) simulations for 100 ns time period using GROMACS. The comparative stability and dynamic behaviour of each residue of the WRKY-DBD variants were analyzed in terms of root mean square deviation (RMSD), root mean square fluctuation (RMSF) values of the backbone atoms for each frame taking the minimized structure as reference. Analysis shows that among the four β-sheets present in WRKY domain, Trp7, Arg8, Lys9, Tyr10, Gly11, Gln12, and Lys13 (β-sheet motif) plays important role in stabilizing the protein–DNA complex. This study reveals the role of computational approaches for preliminary examination of unknown proteins and provides insight into the structural properties of multi- stress responsive WRKY-DNA WBox complex in pigeonpea.

Keywords: WRKY proteins; GROMACS; Molecular dynamics.

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COMPUTATIONAL DRUG DISCOVERY BASED ON NATURAL PRODUCTS AGAINST ACINETOBACTER BAUMANNII

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Abstract: Antimicrobial resistance has been reported in opportunistic pathogen bacteria A. baumanniiwith alarming rate so far few drugs/inhibitors Carbapenem, Bedaquilineetc were developed as an effective treatment against the infection but there efficacies have been found to be challenged in due course. Currently a potential drug target BfmR (PDB ID: 5HM6), a response regulator in signal transduction system (TCS), identified by scientific group in bacteria A. baumannii stain AB307-0294 is necessary for its survival. Natural products such as alkaloid, flavonoid, terpenes, have been reported to exhibit effective use towards antimicrobial treatments. In order to address the identified gaps in term of potential lead discovery we proposed to perform the computational interaction study of the downloaded terpenes, alkaloid, phenols etc. available at drug bank database along with potential target BfmR. The docking experiments was carried out with control (Carbapenem, Bedequilineetc) as well as with test molecule (alkaloid) using AutodockVina software and the results revealed docking energy -8.9 kcal/molErvacycline (control) while the test sample Dihydroergocornine an alkaloid molecule with docking energy -10.3 kcal/mol supported the possible use as alternative therapy against A. baumanniiinfection. The work can be enhanced with multiple drug target and taking into account other structure from other resources with large scale docking and simulations studies.

Keyword: BfmR, Molecular Docking, Alkaloids.

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CHEMICAL COMPOSITION AND BIOACTIVITY OF SOME MEDICINAL PLANTS

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Abstract: Himalayan Zone is very rich in medicinal and aromatic plants which are very rich in medicinal properties. Different plant species at high altitude regions shows variation in essential oil components. Essential oils are natural aromatic compounds that are found in stems, leaves flowers and fruits of plants. Climatic conditions and different region from Himalaya shows that the variations in essential oil components. This review mainly focuses on the scope of pharmaceutical crops and their essential oils mainly present in that area. The complex mixture of primary metabolites and secondary metabolites develops chemical properties in essential oils. Essential oils are isolated from different aromatic plants generally distributed in tropical countries across the world. Fresh leaves of Nirgundi (Vitexnegundo L.) shows the presence of essential oils in plants located in to the higher region of Himalayas. The extraction of essential oils was done by Hydrodistilation method. Compositions of essential oils were identified by GC and GC-MS technology. Essential oils of Bupleurumhamiltonii (belongs to Apiaceae family) and Feronia Elephantum Correa were screened for antimicrobial activity against different strains ofbacteria. Based on zone of inhibition and MIC value the oil of BupleurumhamiltoniiBalak showed maximum activity against E.Coli and lowest activity against Aeromonassalmonicida and Salmonella typhi. Feroniaelephantumcorreashowedmaximumactivityagainst E.Coliandlowestactivityagainststaphylococcusaureus.

Keywords: Medicinal plants, Essential oil, Hydrodistilation Method GC, GC-MS.

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MECHANISM OF COPPER (II) MEDIATED CONTRACTION IN RAT TRACHEAL TISSUES

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Abstract: Exposure to higher doses of Copper is harmful though it is essential for good health. Increased level of copper in serum is associated with atherosclerosis, myocardial infarction and stroke as well as pregnancy-induced hypertension. Intentionally high intakes of copper can cause liver and kidney damage and even death. Copper is associated with the hypercontraction of smooth muscle cells in trachea and aorta, preferably in trachea. We analyzed the responses of copper chloride via acetylcholine (Ach) in tracheal rings of rats. The results of the present study revealed that copper causes increase in vasoconstriction of the tracheal rings at concentrations ranges from 1µM to 10µM and maximum at 6 µM Cu(II), in response to ACh. To examine the mechanism involved in copper mediated contraction, we did a series of experiments using apocynin, SNP, verapamil as antagonists. Sodium nitroprusside (SNP), a nitric oxide donor, produced 22% relaxation in unexposed trachea suggesting involvement of NO in tracheal relaxation. This relaxation was reduced to 8% for tissues exposed to Cu(II). It thus appears that copper interacts with NO and reduces its relaxant potential. Apocynin reduces vasoconstriction when incubated alone, but failed to abolish vasoconstriction in copper exposed trachea. Incubation with apocynin (ROS scavenger) did not significantly reduce the hypercontraction produced by copper toxicity, suggesting insignificant amount of ROS production in tracheal tissues at 6µM Cu (II). Since verapamil significantly prevented the tone, influx of extracellular calcium through L-type and T- type calcium channels appears to be critical for hyper contraction mediated by copper.

Keywords: Copper, hypercontraction, Apocynin, Sodium nitroprusside, verapamil

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INVESTIGATION OF STRESS RESPONSIVE DIFFERENTIAL EXPRESSION OF MATRIX METALLOPROTEINASE IN CARDIAC CELLS

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Abstract: Cardiovascular diseases (CVD) are the leading cause of human morbidity and mortality worldwide. Disruption of normal extracellular matrix (ECM) homeostasis due to cardiac stress is the most important event responsible for cardiac remodeling, altering heart structure and function. Therefore, targeting ECM remodeling enzymes such as matrix metalloproteinases (MMPs) has received much interest in terms of developing novel therapeutics strategies. Till now, clinical trials on targeting MMPs are unsuccessful; hence novel strategies need to be developed in order to modulate the expression of MMPs. We aimed to study the expression pattern of MMPs induced by different cardio-toxic compounds. Rat cardiomyocytes (H9C2) were induced by IC50 doses of each compound. Stress induced was confirmed by assessment of intracellular ROS, nuclear morphology and RT-PCR. The mRNA expression level of MMPs (MMP-2, -7, and -9) was studied by RT-PCR. Protein expression of MMPs was assessed by substrate zymography. We detected differential expression of MMP-2, -7 and -9 along with apoptotic marker gene, hypertrophic marker and transcription factor controlling MMPs expression. In conclusion, MMPs show differential expression under different stress agents and hence requires stress specific strategies in order to prevent their dysregulation and use them as potential future therapeutic targets.

Keywords: Cardiovascular diseases, ECM remodeling, matrix metalloproteinases, hypertrophy

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SEAWEEDS AS THE SOURCE OF NUTRACEUTICALS AND THEIR COMMERCIAL PROSPECTS IN INDIA

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Abstract: Seaweeds are macro algae belonging to the Phylum Thallophyta. The major groups of seaweeds are classified based on their colour namely red, brown and green represented by Rhodophyta, Phaeophyta and Chlorophyta. Seaweeds form part of the food around the world. For example, Porphyra sp., (Nori),Gracilariaspecies (Ogonori, Ganjipassi in Tamil),etc.,(Red Seaweeds),Undariapinnatifida(Wakame), Laminariaspecies(Kombu), etc.,(Brown Seaweeds) andCaulerpa spp.,(Sea grapes), Enteromorpha spp.,(Aonori or sea laver) etc., that belong togreen seaweeds are the some of the seaweeds used as food. Seaweeds are also the major source of many nutraceuticals such as minerals (Iodine, Bromine, Potassium and trace elements), pigments, Polyphenols, Proteins and unusual Polysachaarides such as Carrageenan, Agar, many Sulphated polysaccharides which are useful as Prebiotics which help in the better micro-floral composition of the gut. Many compounds are reported that have high Anti-oxidant and Free Radical Scavenger (FRS) activities. The paper will bring about a review of various seaweeds and the classification of Nutraceuticals present in them as well as their commercial potential of exploitation, their cultivation especially those found in Indian waters, future prospects and how they can be useful in the betterment of Fishermen community.

Keywords: Seaweeds, Phylum Thallophyta, Anti-oxidant

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ICABB-119

OVERCOMING BARRIERS FOR NASAL DELIVERY SYSTEMS

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Abstract: The olfactory mucosa in the nose is in direct contact with the brain and cerebrospinal fluid (CSF). The nose brain pathway offers a rapid, direct route for drug delivery to the brain. Intranasal drug delivery which is non invasive is considered more convenient as compared to parenteral route for long term therapy. Rapid absorption of drug, quick onset of action and overcoming hepatic first-pass metabolism are few of the advantages that aids in systemic delivery of drug molecules via nose. However, there are many barriers to this drug delivery including physiological barriers, physicochemical barrier and some formulation factors such as nasal mucus, mucociliary clearance mechanism, efflux transport system and molecular size. Strategies to improve bioavailability of drugs can be adopted to improve nasal absorption. Nasal enzyme inhibitors like trypsin, aprotinin and some absorption enhancers like fusidic acid derivatives increase drug absorption and reduce enzymatic activity. In addition, permeation enhancers open tight junctions and solubilize the drug. Prodrug approach improves nasal bioavailability as it covers the undesired functional groups with another functional groups by optimizing favorable physicochemical properties like solubility and stability. Nasal mucoadhesives like chitosan and dextran in nasal drug delivery are used to increase the retention time and facilitate sustained release of the drug. Biodegradable starch microspheres, nanoparticles and liposomes can be used as carriers to encapsulate an active drug and their properties are varied to maximize therapeutic efficacy. Overall this particulate drug delivery results in increased absorption and stability and also reduce toxicity of the active drug. Nasal drug delivery system dosage forms include liquid nasal formulations, namely, instillation and rhinyle catheter, compressed air nebulizers and metered-dose pump sprays. The dosage for their improved stability can be in powdered form consisting of insufflators and dry powder inhaler. Nasal gels generally experience reduction in post-nasal drip due to their high viscosity.

Keywords: Intranasal drug delivery, nasal mucoadhesives for absorption, nanoparticles for drug delivery, different forms of dosage.

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FERULIC ACID: NANO-THERAPY ALTERNATIVE FOR ALZHEIMER'S DISEASE

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Abstract: In spite of several advancements in modern medicine, there are countless elusive diseases such as Alzheimer Disease (AD) which are still incurable. Progressive research has revealed many genetic, cellular, and molecular markers that characterize AD such as tau-protein aggregates and neural inflammation. Phytocompounds demonstrate viability as neuroprotective alternative treatments and possible application in developing pharmaceutical medicine. Ferulic acid (FA) is an abundant dietary antioxidant, present in plant cell walls naturally, with anti-inflammatory activities. It has gained emphasis as a potential phytotherapeutic molecule because of its free radical scavenging activity and it retains the valuable pharmacokinetic effects in circulation for a longer time.The application of FA has exhibited shielding effects against the pathogenesis associated with the Alzheimer's disease. It has been elucidated in research that FA neutralizes ROS, maintains the mitochondrial membrane potential and hinders the cell death pathways.The only associated drawback in this approach is the low bioavailability of FA, which has been overcome with the employment of nanotechnology. FA-loaded Solid Lipid Nanoparticles (SLN's) exhibited better protection than the free form FA, against oxidative stress induced in neurons making them transcendent carriers in transport of FA into the cells. Here, we elucidate the function of Ferulic Acid, as a potential therapeutic inhibitor of amyloid structures as well as the effects of its nano-formulations on biological models.

Keywords: Alzheimer's disease, Drug delivery, Ferulic acid, Nanoparticles, Phytotherapeutics.

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NANOTECHNOLOGY BASED TREATMENT FOR DIABETES MELLITUS

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Abstract: Diabetes mellitus is one of the most common metabolic disorder effecting millions of people nowadays. Main cause of this disorder is due to decrease in insulin sensitivity, impaired regulation of blood glucose level and beta cells dysfunction. Unfortunately, a number of existing routes of administration have failed to achieve the expected clinical results. However, the most common route of insulin administration i.e.- insulin injections faces many hurdles, like achieving normal pattern of nutrient related basal insulin levels along with accompanied tissue trauma and pain.To ensure the effective delivery of the drugs used for the treatment and to prevent them from degradation, effective carrier based systems are being used recently. Nanoparticles based drug delivery systems are recently being used as carriers for delivery of insulin via nasal or pulmonary routes. Various biodegradable and biocompatible polymers such as PLGA, Chitosan have been employed for targeted drug delivery. In recent reported studies, different types of nanoparticles like PLGA-insulin nanoparticles, dextran-insulin nanoparticles, solid-lipid and chitosan-based nanoparticles are developed and have been reported to offer therapeutic effect in treatment of Diabetes. In the present review, discussions about recent interventions of advanced nanoparticle based delivery of therapeutics as a promising approach for the treatment of Diabetes.

Keywords: Diabetes mellitus, insulin, nanoparticles, Poly Lactic-co-Glycolic Acid (PLGA).

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DEVELOPMENT OF FORMULATIONS FOR ANTI-ALZHEIMER'S DRUGS

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Abstract: Alzheimer's disease (AD) is rapidly becoming a major public health threat with increasing numbers of affected individuals as the world's population ages. Progressive research has revealed many genetic, cellular, and molecular markers that characterize AD such as tau-protein aggregates and neural inflammation. As the need for novel and cost-effective treatments increases, researchers have turned towards traditional medicine. Natural polyphenols exert protective action from the main cause of most neurodegenerative diseases, the oxidative stress. These phyto- compounds like naringenin, ferulic acid and lipoic acid are studied as neuroprotective alternative treatments. The associated drawbacks were the low bioavailability and poor aqueous solubility, which has been overcome with the employment of nano-based drug delivery. In the present study, narengenin loaded oil in water nano-emulsions were prepared. Initial solubility studies were carried out using various oils, surfactants and co- surfactants, of which coconut oil, Tween 80 based emulsion showed maximum clarity. This was further validated using transmittance studies where the prepared nano-emulsion showed >80% transmittance.

Keywords: Alzheimer's, Narengenin, Nano-emulsion.

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HEAVY METAL AND PHYTOCHEMICAL CHARACTERIZATION OF COMMONLY USED INDIAN SPICES AND HERBS

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Abstract: Raw herbs are used extensively all over the world as potent remedies to cure health aberrations; from cold to cancer. Herbs are commercialized extensively throughout for various medical purposes and sold over the counter and prescribed by lots of local practitioners. Medicinal plants and their extracts deserve special attention because of the important influence they have on human health. Presence of heavy metals in herbs makes them carcinogenic and poses serious threat to all life forms. Therefore, the present study aims at assessing market samples of six commonly used medicinal plants Foeniculim vulgare, Myristica fragrance, Cinnamomum zeylanicum, Elettaria cardamomum, Terminalia chebula, Withania somnifera from different geographical locations across India for the presence of heavy metals (Pb, As, Hg, Cd, Cr). Passport data of the plant materials has been documented where ever possible and all the samples were authenticated macroscopically along with accession numbers from authorized institute. The samples were analysed for the presence of heavy metals by ICP-MS and the testing was carried out as per test procedures mentioned in Ayurvedic Pharmacopoeia of India (API). Among the six herbs; Pb, As, Hg and Cd were found within the permissible limit specified by API. Higher amount of cadmium was observed in Cinnamomum zeylanicum (0.494 mg kg-1). Chromium was found to be very high in Terminalia chebula, Withania somnifera and Elettaria cardamomum in some zones and near base line in rest herbs and respective zones. Phytochemical screening was also carried out to ascertain the impact of heavy metals on these plants.

Keywords : Herbs, heavy metals, toxicity, secondary metabolites, chromium.

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DOCKING STUDIES TO INTERPRET THE ROLE OF CAMPHENE AS A BETTER INHIBITOR OF INOS

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Abstract: Nitric oxide (NO) synthases are a family of enzymes responsible for catalyzing the production of nitric oxide from L-arginine. iNOS is one of three major isoforms of NO synthases. Increased iNOS activity has been positively correlated with the degree of malignancy in several cancers including melanoma. As the current therapeutic strategies used to inhibit this enzyme are often found to be associated with various toxic/side effects at the levels of this enzyme, we have chosen a natural molecule Camphene for our study to be evaluated as an iNOS inhibitor. The structure of camphene has been collected from PubChem database and structure of iNOS was retrieved from the Protein Data Bank. Geometry optimization of the ligand was done through Avogadro. Swiss ADME tool was used for drug likeness study of Camphene. This revealed that it satisfies Lipinski's rule of five. CASTp analysis was done to predict the active site of iNOS. Molecular docking studies were performed using Argus Lab 4.0.1 to evaluate and analyse the interaction of the enzyme with camphene and the energy value obtained was -7.49 kcal/mol. Aminoguanidine was selected as control inhibitor of this enzyme and the binding energy obtained for this molecule was found to be -4.49 kcal/mol. This indicates that camphene can be a better inhibitor of this enzyme and can be used to control its activity in various diseases.

Keywords: iNOS, Camphene, docking

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GREEN SYNTHESIS OF METAL NANOPARTICLES AND EVALUATION OF THEIR ANTI-CANCER ACTIVITY: REVIEW

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Abstract: Since the beginning of the nanotechnology era, many related studies and researches have been done to develop the most suitable method for the development of metal nanoparticles using various agents. So far nanoparticles produced using natural products obtained from plants are most preferable as they are comparatively more stable in nature and have faster rate of synthesis. Metal nanoparticles are prepared using various chemicals such as acetic acid, nitric acid, etc also. and through microorganisms such as Fusarium solani, Actinomycete, Rhodococcu species, etc. Conditions like the use of toxic chemicals, high temperature, and vacuum conditions, required for bottom to top approaches, make them unsuitable for cancer therapies and by using natural products for the synthesis, these conditions can be avoided. In this article we discuss various methods of producing nanoparticles using natural products for cancer therapeutics.

Keywords: Nanotechnology, Metal nanoparticles, Green synthesis, Anti-cancer activity.

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INVESTIGATION OF PROTECTIVE ROLE OF CURCUMIN ON HYDROGEN PEROXIDE INDUCED OXIDATIVE STRESS IN CARDIOMYOCYTES

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Abstract: Reactive oxygen species (ROS) and free radicals generated due to exposure to environmental toxins such as cigarette smoke, air pollutants, heavy metals, UV radiation, pesticides etc. leads to several diseases including cancer, pulmonary diseases, diabetes and cardiovascular diseases (CVDs). Hydrogen peroxide (H2O2) is the most commonly generated ROS species in CVDs and results in oxidative stress which if persists may lead to heart failure. Curcumin, a bioactive compound of Indian spice Turmeric (Curcuma longa), is assessed for its antioxidative role and has been recently reported as a cardio protective agent. We aimed to study the protective role of Curcumin on Hydrogen Peroxide-induced production of ROS in cardiomyocytes. In the present study, H2O2 was used as an exogenous oxidant to induce stress in H9c2 cardiac cell line. Additionally, the protective effect of Curcumin was investigated. Confirmation of stress was carried out by RT PCR of β-MHC, a marker gene known to be elevated under stress conditions. Oxidative stress was assessed by 2',7'-dichlorfluorescein-diacetate (DCFH-DA) staining which showed a remarkable increase in reactive oxygen species (ROS) production on the treatment with H2O2. This was further confirmed by calcium influx assay. The activity and expression of antioxidant enzyme Superoxide dismutase (SOD), through zymography and spectrophotometry was found to increase on treatment with H2O2. Curcumin treatment further supplemented SOD mediated response. We conclude that there exists a promising potential of Curcumin to be used as a therapeutic agent in oxidative stress induced cardiac pathologies.

Keywords: Cardiovascular diseases, H2O2, hypertrophy, environmental toxins

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CHARACTERIZATION OF CHROMIUM STRESS RESPONSIVE MICRORNAS IN PLANTS

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Abstract: In the present study we focus on the identification of miRNAs and their potential targets in three different model plants namely Oryza sativa, Arabidopsis thaliana, Medicago truncatula and characterization by various bioinformatics tools and methods such as mirbase, Muscle, targetscan, psRNA etc. Sequence Identification of miR169 & miR160 genes and precursors from Arabidopsis thaliana (ath), Medicago truncatula (mtr) and Oryza sativa (osa) were obtained from the miRBase database. Sequence alignment of mature miRNA169 and miRNA160 from, M. truncatula, O. sativa and A. thaliana were performed using Multiple Sequence Alignment Tool (MUSCLE/SEA VEIW).We compare the % identity which shows conservation. After that, we constructed the phylogenetic tree using the maximum parsimony (MP) method. We observed that all the mature sequences of both miRNA were identical in A. thaliana, while changes were found in some bases in O. sativa and M. truncatula. The maximum likelihood (ML) topology and the maximum parsimony (MP) tree of mature miR169 and miR160 were found to be quite similar, except for the combination of miR169 and miR160 species. Our target prediction showed various targets involved in heavy metal stress (cr stress) among the three model plants. Our study has potential to identify miRNA targeted genes and their roles in regulating diverse developmental and chromium stress related processes in plants.

Keywords: microRNA, Plants, Genes, Chromium, Stress, Bioinformatics

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MICRORNAS AS PLANT REGULATORS: FOCUS ON HEAVY METAL STRESS

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Abstract: In the production of cultures Metal toxicity is one of the main factors that affect plants. This includes metals that are essential for plants (copper, iron, zinc, manganese) and non-essential metals (cadmium, aluminum, cobalt, mercury). A primary common effect of high concentrations of metal, such as aluminum, copper, cadmium or mercury, is inhibition of root growth. The toxicity of the metal triggers the accumulation of reactive oxygen species, leading to damage of lipids, proteins and DNA. Plant response to metal toxicity involves a number of biological processes that require precise and precise regulation at the levels of transcription and post-transcription. MicroRNAs (miRNAs) are non-coding RNAs of 21 nucleotides that regulate gene expression at the post-transcriptional level. A miRNA, embedded in an RNA-induced silencing complex, promotes the cleavage of its target mRNA, which is recognized by almost perfect base complementarity. In plants, the regulation of miRNA is involved in the development and also in the responses to biotic and abiotic stress. We review new advances in the identification of miRNAs related to metal toxicity responses and their potential role according to their targets. Most plant-responsive miRNA targets for plant metals are transcription factors. Information on metal-sensitive miRNAs in different plants points to important regulatory roles for miR319, miR390, miR393 and miR398. The target of miR319 is the transcription factor TCP, implicated in growth control. The miR390 exerts its action through the biogenesis of small trans- acting interfering RNAs that, in turn, regulate auxin responsive factors. MiR393 targets the TIR1 / AFBs auxin receptors and a bHLH transcription factor. Increasing evidence points to the crucial role of miR398 and its targets, discontinuous Cu / Zn superoxide in the control of oxidative stress generated after high exposure to copper or iron.

Keywords: microRNA, Plants, Genes, Heavy metal, Stress, Bioinformatics

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ENDOMETRIAL HYPERPLASIA AND CANCER: A MECHANISTIC APPROACH

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Abstract: Endometrial hyperplasia is generally caused by excess estrogen without progesterone. If ovulation does not occur, progesterone is not made, and the endometrial lining is not shed. If menstrual cycle doesn't occur, the endometrium may continue to grow in response to estrogen. A total of 288,000 patients were recently diagnosed with endometrial cancer worldwide in 2008. The incidence of endometrial cancer is probably going to still increase supported these recent trends.

Several histological classification methods have been proposed to correlate EH architecture and cytological features with the risk of progression to endometrioid EC. The two prominent classification systems are The World Health Organization (WHO) system introduced in 2003 and the Endometrial Intraepithelial Neoplasia (EIN) system, introduced in 2000.In 1994, the WHO classified endometrial hyperplasia into four categories:simple hyperplasia without atypia, complex hyperplasia without atypia, simple atypical hyperplasia, complex atypical hyperplasia. In its latestreportof2014,classificationisdividedintotwo:hyperplasiawithoutatypia,atypicalhyperplasia/endometrioidintraepithelialneoplasia.

Yet, there's no clear mechanism acknowledged regarding EH. However there are several mechanisms concerned in it. Here we will discuss regarding endogenous hormones and cancer development, excess weight and endogenous internal secretion mechanism and progesterone dysregulation. There are some risk factors like polygenic disease, obesity, smoking, etc. which are of main concern. Environmental factors, including estrogen, an abnormal mismatch repair (MMR) system, genetic abnormalities, and aberrant methylation of DNA and microRNA, are currently proposed as major mechanisms of carcinogenesis in endometrial cancer. Increased endometrial cancer risk has been associated with early menarche and late menopause.

Keywords: Endometrial Hyperplasia, Endometrial Intraepithelial Neoplasia (EIN), CytologicalAtypia, Carcinogenesis.

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RISK FACTORS AND THERAUPETIC OPTIONS OF ENDOMETRIAL HYPERPLASIA

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Abstract: Endometrial hyperplasia (EH) is the morphological malignancy is which the abnormal proliferation of the endometrium results in increase in gland-to-stroma ratio when compared to normal endometrium. The clinical significance of EH related to the risk of development of endometrial carcinoma (EC). The atypical form of endometrial hyperplasia progression results in the formation of EC. Endometrial cancer was historically noticed in post-menopausal women. With the rising endometrial hyperplasia it is being noticed in pre and peri-menopausal women. This is creating the challenges for diagnostics and therapeutic techniques. Endogenous hormones seem to play a vital role within the development of endometrial carcinoma. Alternative hormone-related factors associated to risk are parity and use of exogenous oestrogens for oral contraception or postmenopausal replacement therapy. More risk has been associated with plasma concentrations of oestrogens, progestin, androgens, SHBG, and insulin. It's typically thought that excess weight influences endometrial carcinoma risk through changes in endogenous hormone metabolism. Presently, cyclic progestin or hysterectomy constitutes the main treatment choice for EH without or with atypia, respectively. However, clinical trials of secretion therapies and definitive standard treatments stay to be established for the management of EH. Moreover, therapeutic choices for EH patients are likely to preserve fertility, are difficult and need nonsurgical management. Therefore, future studies ought to specialise in analysis of recent treatment methods and novel compounds that might at the same time target pathways concerned within the pathological process of oestrogen-induced EH. Novel therapeutic agents exactly targeting the inhibition of oestrogen receptor, growth factor receptors, and signal transduction pathways are possible to represent an optimal approach for treatment of EH.

Keywords: Endometrial Hyperplasia, Endometrial Carcinoma, Oestrogen, Progesterone, Therapeutics.

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PHAGE DETECTION AND GENOMICS IN WOLBACHIA ENDOSYMBIONT FROM DROSOPHILA HOST

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Abstract: Wolbachia is a gram negative endosymbiotic bacteria of Rickettsiaceae family which infects a wide range of insects. This bacterium shares both mutualistic and parasitic association to live in harmony with the host it infects, at the same time using methods such as Cytoplasmic Incompatibility, Male-Killing or Feminisation as a tool to ensure its persistence inside the host. 90% of the Wolbachia genomes belonging to arthropod host were found to be infected with a phage-like element, known as WO phage. WO phage like any other bacteriophage has a unique structural and genomic composition constituting of several mobile genetic elements. Literature suggest the role of WO phage in assisting Wolbachia to establish a strong association with the host by using horizontal gene transfer. Certain genes present in WO phage i.e. CifA and CifBare also known to play a major role in cytoplasmic incompatibility depicted by some Wolbachia strains. In the light of these developments, in the present work we have tried to detect the presence of phage genome in Wolbachiainfected Drosophila host collected from natural population of India using PCR. Further, we want to identify and annotate the phage genomes present in whole genomes of four Indian Wolbachia genomes using different bio- informatics software. Also, in order to study the gene transfer events across the phage and Wolbachia genomes we studied the genes present in the boundary of the phage regions in Wolbachia. The comparative analysis of phage genes across these whole genomes will prove to be beneficial in a better understanding of the tripartite association of phage-Wolbachia- Drosophila.

Keywords: Indian, Drosophila, Wolbachia, WO phage, detection, genomics

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S. CUMINI POLYPHENOLS AS MMP INHIBITORS UNDER CARDIAC STRESS

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Abstract: Matrix metalloproteinases (MMPs) are a group of zinc dependent proteolytic enzymes cleave all major protein components of extracellular matrix. There are various essential biochemical and molecular aspects of MMPs in pathophysiology of human diseases. There is compelling scientific evidence that different MMPs, especially MMP-2 and 9, play important roles in the development of cardiovascular diseases where inhibition of these enzymes would be beneficial in treating cardiovascular complications. Syzygium cumini (or black berry) is known for curing diabetic complications, however, its role in diabetes-induced cardiomyopathy is not properly defined. We identified different polyphenols present in crude extracts of S. cumini and further screened for their anti-diabetic as well as cardio-protective potential. We hypothesize that S. cumini polyphenols can be used as natural MMP inhibitors and used in diabetic cardiomyopathy with enhanced therapeutic potential. In the present study, we investigated the regulation of MMP-9 by S. cumini methanol seed extract (MSE) in diabetic cardiomyopathy using real-time PCR, immunocytochemistry, gel diffusion assay, and substrate zymography. The findings indicate that MSE significantly suppresses MMP-9 expression and activity in high glucose (HG)-stimulated cardiomyopathy. Hence, S. cumini MSE may be useful as a functional food and dietary supplement to regulate HG-induced and MMP-9 mediated cardiac stress.

Keywords: Matrix metalloproteinase (MMPs), S. cumini, Cardioprotective, ECM remodeling, H9c2 cardiomyocytes.

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NATURAL PRODUCTS AS ECM MODULATORS IN NEURODEGENERATIVE DISEASES

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Abstract: Wide range of conditions primarily affecting the neurons of human brain is collectively known as neurodegenerative diseases and results in progressive degeneration of nerve cells resulting in ataxias, difficulty in movement and dementia, altered mental functioning. Nowadays, brain stroke has emerged as major reasons of mortality across the globe. In absence of oxygen, death pathways get activated rapidly in brain cells. Other neurodegenerative disease includes parkinson's disease, prion disease. Present therapies are available for the later stages so, there is an urgent need of natural therapeutic strategies that would aid in curing the disease at initial level without compromising the brain functioning. Literature reports that extracellular matrix (ECM) components of brain cells consists several proteins and enzymes that are responsible for ECM synthesis as well as degradation. Matrix metalloproteinases (MMPs) are one such enzymes' subfamily that is responsible for degradation and remodelling of ECM proteins. And their activity is tightly regulated at several levels including cleavage of prodomain, allosteric activation and complex formation with tissue inhibitor of metalloproteinases (TIMPs). Remodeling of ECM is the main cause of disease progression. Gelatinases (MMP-2 and MMP-9) are responsible for disruption of the blood–brain barrier, angiogenesis, neurogenesis, remodeling of the basal lamina. Hence, there is a need to inhibit the effect of these MMPs by treating with bioactive compounds. It is reported that Curcuminoid, Resveratrol, Baicalein have been used to inhibit activity of MMPs and hence regulating disease progression. These effects were analyzed in detail by in silico molecular docking where protein-ligand interactions were done for MMPs and reported bioactive compounds. Curcumoids displayed highest binding affinity towards gelatinases and can further be characterized in vitro and in vivo.

Keywords: Neurodegenerative disease, Matrix metalloproteinases, TIMPs, ECM remodelling.

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BIOLEACHING OF RARE EARTH ELEMENTS BY MICROBES

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Abstract: A simple and effective technology which uses microorganisms for metal extraction from low grade ores and mineral concentration is bioleaching. In this era of environmental decline, and resource scarcity, enhancing microbial function in sustainable mining has become a prerequisite for the future of the green economy. The extensive use of rare earth elements (REEs) in the recent years, in green and smart technologies has led to an increase in the concentre on restoration and separation of REEs from mine matrices. The restoration of REEs being complex and energy intensive using the old-fashioned methods, led to the requisition to unravel processes which are more economically practicable and environmentally friendly. Using phosphate solubilizing microorganisms for bioleaching of REEs provided us with a biotechn ical approach for the recovery of REEs from primary and secondary sources. But still what remains a major challenge is to develop a successful method for bioleaching of REEs by managing and interpreting their microbial-mineral interactions. This review focuses on the use of microbes for the bioleaching of REEs and highlights the importance of genomic studies in mandate to contracted down potential microorganisms for the optimal extraction of REEs.

Keywords: Phosphate solubilizing microorganisms, Monazite bioleaching, rare earth elements, sustainable mining.

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CALOTROPIS GIGANTEA AND TAGETES ERACTA AS POTENTIAL HERBAL MEDICINE

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Abstract: India is well known for 'Ayurveda', a traditional system of healthcare, which is based on the use of natural herbs and herb products (phytocomponents) for therapeutic measures to boost total wellness and improve quality of human life. Herbal phytocompounds are basically chemical compounds naturally produced by plants to help them thrive competitors and predators. Flavonoids are responsible for the colour present in the fruit and are found to be useful due to their anti-diabetic and hypoglacemic activity. Tannins have a role in promoting wound healing and also have anti- diabetic properties. Terpenoids serves as anti-septic and reduces inflammation. The phytochemical content of three ethanolic extracts; namely, leaves of Calotropis gigantea and both flowers and leaves of Tagetes eracta were estimated to find out their possible potential role in health sciences.In addition, they were also tested for their antibacterial activities against pathogenic bacteria and fungi. Qualitative phytochemical analysis of these plants confirmed the presence of various phytochemicals like alkaloids, flavonoids, tannins, terpenoid, saponin, steroid and carbohydrates in the extracts. The ethanolic extract of leaves of both the plants and flowers of Calotropis gigantea showed significant antibacterial activity against Micrococcus luteus, Pseudomonas flourescence, Bacillus liceniformis while tested using Agar well diffusion method. Extract of leaves of Calotropis gigantea was found to be most effective antibacterial activity against Pseudomonas flourescence.

Keywords: Phytochemicals, Ethanolic extracts, Phytochemical analysis, *Calotropis gigantean,Tagetes eracta*

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SUSTAINABLE BIOFUEL ECONOMY

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Abstract: Biofuels are some promising energy sources that have garnered much public attention in recent years. In today's world, there is a dire need for energy resources for the increasing the technological developments. Attaining these advancements cannot be possible by using conventional fossil fuels as the source of energy, because of the environmental and health hazards they pose. The global economy is thus in a dilemma— whether to control the depleting environment or to support the global development. As a result, to satisfy both these problems, the global economy is shifting towards renewable energy, especially biofuels. Biofuels can play a key role in solving these problems in many nations, as long as the biomass sources are grown, converted, and used for sustainable development. The most common biofuels available in the markets are ethanol, biodiesel, and biogas. Conventionally, biofuels were produced from food crops such as sugarcane and corn starch (first-generation biofuels) or non- food seed crops such as Jathropa (second-generation biofuels). Recent advancements allow for extraction of biodiesel and ethanol from some algae (third and fourth generation biofuels). The biofuel industry is emerging as a potential to help countries with minimal oil reserves to become imports independent and enhance their economy. Many countries like USA, Brazil and Germany are the market dominators for bioethanol production. Biodiesel production is dominant in Malaysia and Indonesia, whereas the European Union is urging its member countries to produce biogas. Biofuels are emerging as a potential for clean and efficient renewable sources of energy, thereby, initiating various policies for their enhanced production and use worldwide.

Keywords: Biofuels, Global Economy, Biodiesel, Biogas, Ethanol, Sustainable Development

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UMBELLICAL CORD BLOOD CELLS BASED THERAPY

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Abstract: Umbilical cord blood is the blood left in placenta after delivery of baby. The collection procedure of cord blood is painless and involves no risk factors. It consists of haematopoietic cells and mesenchymal stem cells. Cord blood cells consist of stem cells that are building block of our immune system. It is used to treat a large number of genetic disorders and diseases like leukaemia, heart diseases, Parkinson disease etc. In last three decades it has become an important source, since first transplant in 1998 that was performed to a person with anaemia. Umbilical cord blood cells are collected, preserved and sent for processing, testing and storage. Testing for both mother and baby is done before collecting of these cells and then stored in public and private banks. Around 8000 people worldwide are using umbilical blood cord stem cells for medical therapy and treatment. Earlier it is considered as biological waste but now it is widely accepted and used as an alternate to bone marrow transplant. Donor matching is not so important as mismatch cord blood cells can still be very effective and hence have wider options for treatment of several diseases. It has wider applications in therapeutics, regenerative medicines treating genetic disorders and deadly diseases.

Keywords: Cord blood cells, Disease, Treatment, Stem cells

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ANTI-OXIDANT AND ANTI-GLYCATIVE POTENTIAL OF AGED GARLIC EXTRACTS

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Abstract: Cardiovascular complications are the leading cause of mortality worldwide. The prevalence of the disease is associated with increased life expectancy, sedentary lifestyle, and diseases including obesity, hypertension and diabetes mellitus. The cardiovascular complications are very significant in diabetic patients and the condition is known as diabetic cardiomyopathy. Its prevalence is increasing nowadays significantly and primarily characterized by myocardial fibrosis, dysfunctional remodeling, and associated diastolic dysfunction that further leads to systolic complication, and clinical heart failure. In diabetes induced hyperglycemic conditions, there occurs a glycation of different signaling molecules by covalent bond interactions and form advance glycation end products (AGEs). These protein-glucose conjugates alter the protein conformation and functioning thereby causing cardiovascular complications.

Hydrogen sulfide (H2S) is a third endogenous gasotransmitter that is synthesized in cardiovascular system. Recent studies have shown that H2S holds great potential in protecting heart against myocardial dysfuntion, cardiac hypertrophy, ischemic repurfusion injury and heart failure. Various mechanisms including anti-oxidative action, protection of mitochondrial function, down-regulation of apoptosis, anti-inflammatory responses, angiogenic actions, ion channel regulation, and nitric oxide interaction, could be responsible for the cardioprotective effect of H2S. Our study cardioprotective effect mediated by H2S as a potent anti-glycation and anti-oxidant gaseous molecules in diabetic cardiomyopathy condition.

Keywords: Advance glycation end products (AGEs), Diabetic cardiomyopathy, Hydrogen sulfide signaling, H2S.

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CHARACTERISATION AND PARTIAL PURIFICATION OF BIOACTIVE COMPOUNDS FROM MICROCOLONIAL FUNGI

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Abstract: Multi-drug resistance of pathogens has necessitated the need for novel drug discovery. For many years natural products from microorganisms have been the major sources of therapeutic agents. Under-explored habitats harbour novel bio and chemodiversity. The Thar Desert in India is one such understudied habitat. A black coloured yeast-like microcolonial fungus TD-062 was obtained from red soil of Thar Desert. The isolate was grown on Potato Dextrose Agar. Aqueous, ethyl acetate, butanol and petroleum ether extracts of TD-062 culture supernatant were investigated for antioxidant and antimicrobial activities against a panel of Gram positive and Gram negative bacteria and fungi and plant pathogens Xanthomonas oryzea, X. citri, X. campestris, X. anopodis and Bipolari smaydis. Results of morphological characteristics indicated that the fungus TD- 062 was distantly related to Aureobasidium sp. of Ascomycetes. It had septate hyphae with single celled, hyaline, thick walled conidiospores present terminally or laterally on unsegregated vegetative hyphae in dense clusters. Results indicated that ethyl acetate extract of TD-062 showed maximum antioxidant activity. Antimicrobial activity of ethyl acetate extract of TD-062 was observed against X. oryzea and X. campestris. Characterization of the extracts is in progress.

Keyword: Microcolonial, Thar Desert, TD-062, Multi-drug resistance.

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HUMAN MICROBIOME AS A FUTURE MEDICINE

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Abstract: Recent studies have increased the knowledge of human microbiomes and found them as a potential source in novel therapeutics and can be considered as future medicine. In case of several human diseases, their changes have been reported e.g. diabetes, obesity, cancer, liver and neurological disorder. Thus, the human microbiome projects have shown potential in the medicine world as they open new ways of treating any chronic and acute diseases. Microbiota is found to have a role in developing the immune system of an individual. The commensal microbiomes have a role in controlling the maturation of the mucosal immune system, whereas the pathogenic microbiome leads to immunity deregulation which results in disease development. The gut mucosal immune system is made up of lymph nodes, lamina propria and epithelial cells which constitute a defensive barrier for the integrity of the intestinal tract. Many diseases have been found to be linked with the gut microbiota and still studies are going on to establish the relation between the gut microbiota and their role in regulating various function in human body. Probiotics, Prebiotics and Fecal microbiota transplantation (FMT) play an important role in restoring gut microbial health. FMT helps in fighting disease and is under clinical trial phase. Thus, in future, the treatment will be changing its shape and from fighting the symptom of a disease one will be treating the cause of the disease which might be dysbiosis of gut microbiota. This will lead to an increase in lifespan, health and cost of treatment will also be decreased.

Keywords: Human Microbiome, Future Medicine, Fecal microbiota transplantation (FMT), Human diseases

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COMPARATIVE STUDY ON MEDICINAL PROPERTIES OF INDIAN OCIMUM SPECIES

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Abstract: The predominant cause of global morbidity and mortality is lifestyle-related chronic diseases, many of which can be addressed through Ayurveda with its focus on healthy lifestyle practices and regular consumption of adaptogen herbs. Of all the herbs used within Ayurveda, tulsi (Ocimum sanctum Linn) is preeminent and scientific research is now confirming its beneficial effects. Ocimum sanctum L has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals and physical stress from prolonged physical exertion, ischemia, physical restraint and exposure to cold and excessive noise. It has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties. Several species of Ocimum exist in nature; therefore, finding out the most efficient one with high potential medicinal properties will help in formulation of more effective herbal drugs. We performed phytoconstituent analysis of different Indian Ocimum species for the same and two species are found to be the best which will be further analysed for their anti-ageing properties.

Key words: Ayurveda, Indian Ocimum species, phytoconstituent, Medicinal properties, anti-ageing

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BIOREMEDIATION OF PLASTIC WASTE

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Abstract: Bioremediation is the innovation that utilizes microorganism metabolism system to expel pollutants. This technique incorporates biostimulation (triggering viable local microbial population), bioaugmentation (adding cultured microorganisms for the purpose of biodegrading), bioaccumulation (live cells), biosorption (dead or inactive microbial biomass), phytoremediation (plants) and rhizoremediation (plant and microorganism cooperation). Plastics are the polymer which becomes mobile upon heating and can be casted into moulds. The use of this synthetic polymer is growing at a rate of 12% per year and about 140 million tons of synthetic polymers are produced worldwide each year. It causes serious threats to the environment both during its production and after its disposal. Hence, an innovative method of bioremediation should be adopted, that utilizes the potential of microbes in degrading non-biodegradable plastics. This review mainly focuses on new ways to utilize microbial activity in reducing environmental pollution to a vast extent. For example, the diverse metabolic capability of microbes to cleave the polymer chain using certain enzymes and convert them into monomers and oligomers can be exploited for bioremediation of plastic waste, making this planet a safe home to live, and directly preventing the humans, animals, plants and soil from harmful consequences of plastic pollution.

Keywords: Plastic; microbes; polymer; environment; bioremediation

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TECHNIQUES FOR PURIFICATION AND CHARACTERISATION OF NATURAL PRODUCTS

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Abstract: Natural products are those compounds produced by living organisms. All natural products begin as mixtures with other compounds from the natural source, from which the product of interest is isolated and purified. The isolation of a natural product of interest refers to the isolation of sufficient quantities of pure chemical matter for chemical structure elucidation, derivitization/degradation chemistry, biological testing, or the isolation of "analytical quantities" of the substance, where the focus is on identification and quantitation of the substance and where the quantity isolated depends on the analytical method applied. The methods of isolation applied to achieve these two distinct scales of product are distinct, and involve extraction, precipitation, adsorptions, chromatography, and sometimes crystallization. This work focuses on the several purification techniques involved after the step of extraction in the purification of natural compounds to obtain pure compounds, and further to characterise the compounds obtained through Gas Chromatography-Mass Spectrometry. It also focusses on how GC-MS is related to metabolomics and the advances involved in the process of linking the metabolome of various organisms with the new databases to comparatively analyse the compounds and metabolites present.

Keyword: Natural products, purification techniques, GC-MS

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CHARACTERISATION OF CAPSICUM ANNUUM CULTIVARS FOR BIOACTIVITY

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Abstract: Capsicum annuum (chilli) is an important ingredient in Indian food. It has many constituents conferring bioactivity and thus has various therapeutic effects. In this work, we have studied the bioactive phytochemicals and antimicrobial activities of different local cultivars of C. annum. The cultivars were Guntur Sannam S4, Teja, Bydagi, Dhanni, and Degi. Aqueous and organic solvent extracts (petroleum ether, ethanol, ethyl acetate) of fruits were prepared of each cultivar. Antimicrobial activity was assessed against Pseudomonas, Bacillus subtilis, Escherichia coli, and Saccharomyces cerevisiae. Proteins, terpenoids, and alkaloids were present in all organic solvents of the selected varieties. Saponins and tannins were present in aqueous, and ethyl acetate extracts of Guntur Sannam S4, extracts of ethanol, aqueous, petroleum ether of Teja chilli, extracts of ethanol, ethyl acetate, petroleum ether of Degi chilli and extracts of aqueous, ethyl acetate, petroleum ether of Dhanni chilli. Only saponin was present in ethanol and petroleum ether extracts of Bydagi chilli. Antibacterial activity was observed against all the bacteria but no antifungal activity. Ethyl acetate and aqueous extracts of all the varieties exhibited antimicrobial activity. We can conclude that Capsicum annuum has high proportion of alkaloids, proteins, terpenoids, saponins and tannins, which could play a role in conferring antimicrobial property.

Keywords: Capsicum annuum, antimicrobial activity, cultivars, bioactivity

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BIOENGINEERED CROPS: CAN THEY ENHANCE FOOD SECURITY IN INDIA?

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Abstract: Genetically modified (GM) crops are bioengineered crops that are scientifically made to increase nutritional value, more resistant to certain pests, increase shelf life, reduction in spoilage compared to traditional crops. GM crops also create possibilities for food security, higher yield in less time which is important for developing countries like India. They also have enhanced stress tolerance and wider adaptability which makes crops survive in extreme weather conditions unlike traditional crops. The present study emphasizes on the introduction of GM crops commercially in India and its survival since then in India and various other parts of the world. The several types of commonly found GM crops in the market are corn, cotton, rice, tomato, soyabean. The initiation of India in the agricultural biotechnology began with the approval of plantation of Bt cotton commercially. Many tools like cisgenesis and intragenesis have been developed. Health issues upon consumption and potential environmental risks in GM crops are being avoided using recombinant DNA technology. Genome engineering tools like CRISPR/Cas are known to be highly promising technology to modify plant genomes. The highlight of this poster centers around the challenges of GM crops in the market and development of improvedvarietiesaimedforconsumeracceptance.Willtheimprovedvarietiesbeabletoaddresstheproblemoffoodsecurityin India?

Keywords: Genetically modified (GM) Crops, Bt cotton, Recombinant DNA technology, CRISPR/Cas, Food security.

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HEXOKINASE-II TARGETING NATURAL COMPOUNDS: A POTENTIAL FUTURE MITOCAN

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Abstract: Mitocans are a novel class of anticancerous drugs known to target the mitochondria of cancer cells by reducing the energy supply to the highly proliferating cancer cells. These mitocans are classified into 8 different classes based on their mode of action.The very first class of mitocans are known to target the enzyme Hexokinase II (HK-II), key protein involved in glycolysis and generating energy for excessive proliferation of cancer cells. Its over-expression is reported for various cancer types. Hence, disrupting HK-II interaction could inhibit the cell proliferation, by reducing the supply of ATP and destabilize the mitochondrial membranes. Literature supports with handful of identified mitocans which are mostly synthetic in nature and are in various stages of clinical trials. However, unlike any other synthetic drugs, there is an expected possibility of side effects, but the use of natural compounds is mostly proven to be a safe alternative therapy. Therefore, our study selected the bioactive compound of less studied anticancer herbs and primarily aim to investigate whether this natural compounds can be a potential future mitocans by targeting the HK-II enzyme. As a pilot study to analyse the compounds as a mitocan, a molecular docking study of HK-II with the selected bioactive compounds (Methyl jasmonate, Oleanolic acid, Asiatic acid and Andrographolide) were performed in Autodock Vina. 2-deoxyglucose (2-DG), Lonidamine and 3- Bromopyruvate (3-BP) are the known inhibitors of hexokinase-II which were used as positive control in our study. As a result we observed that Asiatic acid and Methyl jasmonate exhibit a better binding than that of 2-DG, Lonidamine and 3-BP. This findings points towards the fact that the selected natural compound in our study may act like a better mitocan targeting the HK-II.

Keywords: Mitocan, Molecular Docking, Hexokinase-II, Natural compound, ATP.

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LACTOSE INTOLERANCE:CAUSES AND GENETIC FACTOR,DIAGNOSIS,MANAGEMENT

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Abstract: Across the world, approximately 65% of human population suffer from lactose malabsorbtion or unable to digest lactose after infancy but some human population usually persist upto the adulthood. Lactose tolerance is exceptionally widespread in northeneuropean countries such as swedan and finland. Lactose is a sugar and disaccharide which is abundately found in milk and dairy products. Lactose intolerance (LI) is a condition in which reduction in the ability to digest lactose,lactose is normally broken down an enzyme known as "Lactase",located in the brush border of small intestine . this condition have numerous digestive symptoms like bloating,flatulence, diarrhea, due to the decrease in the amount of lactase in intestine results in poor absorbtion of lactose which cause production of gas. Lactase deficiency or LI broadly classified into 4 categories:primary ,secondry congenital,developmental. Each of them have different causes. LI is diagnosed on the basis of symptoms but it is essential to determine primary hypolactasia(PHL) or maybe secondry causes such as crohn's disease, enteritis. In infants ,usually LI is caused due to the alteration in LCT gene whereas in adults usually caused due to decrease in expression of gene after infancy. PHL is a rare autosomal recessicive disease with unique mechanism that affect infant from birth. There are various methods available for diagnosis of LI or malabsorbtion like jejunal biopsy, LBT etc. Here,in this review we will discuss signs and symptoms,causes,diagnosis,management,and genetic factors of lactose intolerance.

Keywords: lactose intolerance (LI) , Lactase, diarrhea,bloating,flatulence, intestine, LCT gene, primary hypolactasia (PHL) , lactose breathing test (LBT).

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BRUCELLOSIS (ZOONOTIC DISEASE): A RECENT UPDATES

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Abstract: Brucellosis is communicable zoonotic disease it is known by various names including undulant fever or Mediterranean fever Brucellosis is very complex in nature hence it is very serious threat to humans as well as livestock such as dog pig sleep goats camels etc. It has been observed that there is increase in the infection caused by brucellosis in developing countries in Africa, Asia, Arab peninsula, Indian subcontinent and the Middle East. It is complex in nature and significant threat to humans as well as livestock. The effects of human brucellosis vary from associate acute symptom sickness to persistent medical disorders, osteomyelitis, endocarditis, and other syndromes.PCR based diagnosis are done to study the serological assays thus helping in improving the understanding of infection caused by brucella species. Due to lack of efficacy on small number of known standard antibiotics the successful treatment is not achieved.Brucella has shown resistance to some of the known compounds rifampicin, doxycycline, gentamicin, streptomycin. In literature many drug targets i.e. methionyl-tRNA-synthetase (BmMetRS) and Phosphoribosyl-AMP cyclohydrolase (HisI) and histidinol dehydrogenase (HDH) , are well known in brucella for its treatment. Literature further reveals the importance of Methionyl-tRNA-synthetase (BmMetRS) as a promising target for brucellosis drug discovery. aminoquinolones based compounds were recognized as potential ligands against the treatment of brucellosis. The discovery of novel drug target is deploying the several computational methods such as protien-protien interaction network (PPI), choke point analysis, ortholog mapping and many others. Future work refers for understanding the mechanism of action of antibiotic resistance and focusing the application of modern biology specially computational science on large sized data such as NGS data for deciphering the novel drug/ligand discovery through advance approaches.

Keyword: NGS, PPI, Antibiotic resistance, brucellosis

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HEAVY METAL THRESHOLDS IN SOIL: A REVIEW OF SOURCES, SPECIATION, GERMINATION CHEMISTRY & POTENTIAL REMEDIATION TECHNIQUES

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Abstract: Environmental pollution by noxious heavy metals is increasing worldwide due to rapid industrialization and urbanization. Accumulation of these metals is posing serious threat to all life forms. Plants are exposed to heavy metals by various anthropogenic activities like mining and refining of ores, excessive usage of fertilizers and pesticides, disposal of solid wastes, irrigation with wastewater, vehicular exhaust emissions and other industrial activities. Heavy metals induce various physiological, morphological, biochemical malfunctions in plants and cause drastic effects on their metabolism. The most regularly observed outcome of heavy metal toxicity in plant cells is the overproduction of reactive oxygen species (ROS). ROS control major actions like the cell cycle, plant growth, abiotic stress responses, systemic signaling, programmed cell death, pathogen defense and development. Increased production of ROS from heavy metal toxicity degenerate the innate antioxidant defense system of cells and cause oxidative stress. Cells with oxidative stress show symptoms like lipid peroxidation, membrane deterioration and damage to DNA, protein and carbohydrates which hampers the seed germination process. This review discusses the toxic effects of heavy metal pollution and the mechanisms used by microbes and plants for environmental remediation. It also emphasizes the importance of modern biotechnological techniques and approaches in improving the ability of plants and microorganisms to effectively degrade heavy metals at a faster rate, highlighting recent advances in microbial and phytoremediation of heavy metals from the environment as well as future prospects and limitations.

Keywords: Heavy metals, toxicity, seed germinations, plant physiology, remediation.

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INFLUENCE OF TEMPERATURE ON MICROBIAL COMPOSITION IN CRUDE OIL DEGRADATION

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Abstract: Environmental pollution caused by crude oil and its fractions has been a major concern in today's world due to its adverse ecological impact. Oily sludge comprises several toxic components which are carcinogenic, genotoxic, neurotoxic and potent immunotoxicants. Release of these components into the environment is one of the main causes of water and soil pollution. This has necessitated the development of eco-friendly and cost-effective methods for their removal from polluted environments. A number of limiting factors have been recognized to affect the biodegradation of petroleum hydrocarbons. Many microorganisms degrade hydrocarbon components at different rates depending on the concentration of crude oil and amended nutrients. Among physical factors, temperature plays an important role in bioremediation of hydrocarbons by directly affecting the physico-chemical behaviour of oil hydrocarbons, the physiology and diversity of the microbial flora. The rates of growth of each operational taxonomic group are affected differently with temperature, and thus results in altered microbial community composition. We present here the crude oil degradation kinetics and 16S rDNA metagenomics of the developed bacterial consortia from the oily sludge contaminated sediments of Noonmati Refinery, Assam. The bioremediation of Assam crude oil by these bacterial consortia developed at various temperatures (4˚C, 25˚C, and 45˚C) in different concentrations of crude oil (3% and 1%) was assessed in liquid BH medium at different intervals. Maximum crude oil degradation was observed after 5 days in microcosms incubated at 25˚C. Analysis of 16S rDNA metagenomics revealed the abundance of β– Proteobacteria, Firmicutes, γ–Proteobacteria, Bacteroidetes,Actinobacteria, α–Proteobacteria, and unclassified bacteria. Many researchersfrom North-east region, India have studied degradation of crude oil by bacterial isolates, there has been no attempt to systematically investigate the nutrient enhanced crude oil degradation and bacterial diversity with respect to temperature changes which is the objective of our research.

Keywords: 16S rDNAmetagenomic, bioremediation, crude oil, operational taxonomic group

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COMPOSITION OF NATURAL MICROBIAL CONSORTIA FOR DECOLORIZATION OF AZO DYES

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Abstract: Water pollution through the discharge of effluents from the industries is a major concern of the modern world. The release of synthetic dyes into water resources promotes water pollution. Among synthetic dyes, chemically stable azo dyes constitute a highly detrimental class because of its toxicity and high persistence in aquatic environment. Due to their toxic effects, effluents from textile and dye manufacturing industries must receive prior treatment before being discharged into water streams. This has necessitated the development of eco-friendly and cost-effective methods for their removal from polluted environments. Microorganisms being highly versatile have developed enzyme systems for the dye decolorization which have therefore become focus of research attention. In this study we present the composition and kinetics of Azo dyes decolorizing microbial consortia developed from dyes contaminated soil and water near dyeing industry in Wangkhei, Manipur. The azo dyes decolorization by the bacterial consortia develoved in BH medium amended with 500µg/ml Congo Red, yeast extract, glycerol and micronutrient was assessed at different concentrations of azo dyes (Congo Red, Trypan Blue, Remazol brilliant blue and Ponceau S). The culture exhibited good potential in decolorizing 95-99% of all the dyes by the end of 10 days. Analysis of 16S rDNA metagenomics revealed the abundance of γ-Proteobacteria, β-Proteobacteria, Bacteroidia, Flavobacteria, Bacilli, Clostridia, α-Proteobacteria,Sphingobacteria, and unclassified bacteria. Qualitative andquantitative abundance of bacterial population and analysis of azo dyes biodegradation and identification of prominent azo dyes degrading bacterial species from laboratory microcosm and their characterization forazodyesdegradationisthemainobjectiveofourresearch.

Keyword: Azo dyes, 16S rDNA metagenomics, decolorization, biodegradation.

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FORMULATION AND STUDY OF PLANT PROTEINS BASED PRODUCT TO SUBSTITUTE MEAT PRODUCTS/PROTEINS

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Abstract: Textured vegetable protein or TVP is a type of protein obtained from vegetable sources especially soybeans and can be used as a substitute for meat products due to its very low cost. Today, due to increasing demands for nutritious and healthy diets with concerns about the rising prices of meat, TVP finds a perfect place into the top food trends in the field of functional and nutraceutical foods. The aim of this project was to study the alternate sources of proteins from plant, bacteria and other sources which can be substituted for meat proteins with respect to their characteristics like texture, colour, taste and chewiness. Some of the well-studied substitutes of proteins were soy, wheat, potato, peanuts etc. The present study aimed to create formulations of meat with proteins from soy and wheat to have products with similar properties of meat available in the market. Major proteins used in the developed mock meat were TVP (Textured vegetable Protein), whey protein concentrate , vital wheat gluten and soya protein isolate. The project included three formulations which were further analysed for the texture, colour and chewiness as sensory parameters. It was observed in the results that, as the percentage of textured vegetable protein (TVP) decreased from 70% to 30% in the formulation, the hardness, adhesiveness, cohesiveness, springiness, gumminess and chewiness increased. Another advantage of use of textured vegetable protein (TVP) in the formulation was that the amount of soy protein isolate, gluten and water requirements were less which resulted in fibrous structure of the formulation. The product thus developed was stored at -18:C.

Keywords: Textured Vegetable Protein, functional foods, nutraceutical foods, texture, chewiness, gumminess, hardness, cohesiveness, adhesiveness, springiness, soy proteins, gluten.

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IMPACTS OF CHEMICAL FERTILIZERS ON BIOME

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Abstract: To increase the yield of crops extensive chemical fertilizers are applied which contain N-P-K. Plant assimilates nitrogen in form of nitrate. Due to high solubility of nitrate, it is easily leachable and mixes with groundwater; making nitrate a second major pollutant after pesticides. It must be removed from contaminated groundwater to make water potable. It leads to eutrophication condition in lakes Several traditional methods are available like Reverse osmosis, ion exchange membrane bioreactor system, electro dialysis and land disposal but these are time consuming or expensive and hence not extensively used. Agricultural sources of nitrate are chemical fertilizers, manure and animal feedlot. Non-agricultural source of nitrate is mainly solid waste disposal system. High concentration of nitrate in water causes serious issues in humans like methemoglobin, gastric cancer, goitre, malnutrition. Owing to limitation of conventional methods in nitrate removal from water, the most versatile, attractive and widely used technology is bioremediation.

Keywords: Nitrate, Fertilizers, Methemoglobin, Eutrophication, bioremediation

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ROLE OF SAFFRON AND ITS ACTIVES IN PREVENTION AND CURE OF NEURODEGENERATIVE DISEASES

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Abstract: Modern traditional medicines used saffron, a spice derived from the flower of the Crocus savitus plant, for its healing properties. Pharmacological effects of saffron are mainly due to the presence major metabolites namely crocin, crocetin, picrocrocin and safranal. Research shows the intake of saffron has medicinal efficacy against the neurodegenerative disorders. Neurodegenerative diseases like Alzheimer's, Parkinson's pose a major threat to human health. Classic symptoms are memory and cognitive impairments, muscle stiffness, tremors, depression, dementia and disruption of a person's ability to move, speak and breathe. The mechanisms underlying this neuroprotective effects is dependent upon the antioxidant properties of saffron which reduce the oxidative stress and apoptosis. Antioxidant activity of the leaves and tepals of saffron is measured by the free radicals scavenging and ferric ion reducing power. Crocin prevents mitochondrial dysfunction, inflammation and induce various biochemical changes inside the cells to slow down the cell degradation. Saffron can be considered as an alternative approach in the treatment of neurodegenerative disorders.This review highlights the effects of saffron on the neurodegeneration and the fundamental mechanisms.

Keywords: Crocus savitus, Alzheimer, depression, dementia, neurodegenerative disorders, saffron

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EFFECTOR MECHANISMS OF APOCYNIN FOR TREATING NEURODEGENERATIVE DISEASES

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Abstract: Worldwide population growth has been associated with subsequent increase in the aged people afflicted with neurodegenerative disorders. Neurodegenerative diseases (NDD) represent a huge burden in terms of human sufferings and heavy cost associated with the treatment. Alzheimer's disease and Parkinson's disease are most prevalent examples NDDs and Huntington's and Lou Gehrig's disease are the less prevalent examples. There is no effective treatment exists for neurodegenerative diseases. It is being established now that a person affected by neurodegenerative disease may get benefited by selective inhibitors of innate immunity. Apocynin (4-hydroxy-3-methoxy-acetophenone) is a component of the Himalayan medicinal herb Picrorhizakurroa which is considered to be as an inhibitor of NADPH oxidase (NOX) enzyme. There are various isoforms of this enzyme: NOX1, NOX2 and NOX4, which are found to be up regulated by a variety of neurodegenerative factors. Recent studies manifest that genetic and pharmacological inhibition of NOX enzymes can be neuroprotective and has power to diminish harmful aspects of pathology of various chronic neurodegenerative disorders. Microglia is the essential and fundamental cell which is mainly found in brain and they have potential to exert immune functions. A glial cell is usually designated as the macrophage of the CNS. Apocynin is known to be a selective inhibitor of the phagocytic NOX2 and is exceptionally effective at low doses. In this article we will discuss the therapeutic potential of apocynin, for the treatment of various NDDs.

Keywords: Neurodegenerative disorder, antioxidant, microglia, NADPH oxidase,Apocynin, Picrorhizakurroa .

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GENERATION OF CDNA LIBRARY AND EXPRESSED SEQUENCE TAGS (EST) TO ANALYSE THE GENE EXPRESSION AND PHYLOGENETIC RELATIONSHIP: A REVIEW

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Abstract: cDNA library helps in gene expression by identifying the unexpressed genes in the genome sequence. There are various methods of cDNA library construction such as DNA cloning, RT-PCR and in situ hybridization. Analysis of these cDNA libraries is done with the help of PCR primers for gene expression using a reference gene, to which the DNA samples are compared. It helps in identifying the unexpressed genes in the genome sequence. Expressed sequence tags (EST) are approximately 200–800 base pairs (bp)long single-pass reads, they present a economic option for full genome sequencing. Molecular markers recognized using EST analysis is able to provide cues for the genetic studies in future that would be an aid for further exploration of genomes of various species. Similarly, the phylogenetic analysis of various species having comparable genetic history is done after isolation of genes. This helps in identifying the evolutionary relationships between two or more different species. Eventually, homology search and alignment of genes and proteins are done to identify the similarities and differences, and thus mapping the homology search map to analyse the evolutionary history. This article focuses on the importance of cDNA library construction and it use in analyzing the gene expression and phylogenetic relationship among various species.

Key words: EST, phylogenetic relationship, homology search, cDNA library

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X- CHROMOSOME SEQUENCE ASSEMBLY AND ANNOTATION OF INDIAN DROSOPHILA ANANASSAE USING NEXT GENERATION SEQUENCING TECHNOLOGY

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Abstract: Drosophila ananassae, a domestic species of genus Drosophila holds an important position in understanding genetics, behavioural and evolutionary patterns due to its unique features like hypermutability in both chromosomal and extra chromosomal DNA, male recombination, segregation distortion, parthenogenesis. The X chromosome harbours many genes that are important for both sexes.Chromosomal Inversions play a major role in shaping evolutionary, behavioural and genetic processes. The X chromosome of this species shows unique pericentric inversion of mullerA element which shifts it from normal to sub-metacentric chromomsome. Although, the whole genome assembly of D. ananassae is available in database, but none of the chromosomes have been annotated. We have generated the whole genome sequence of D. ananassaefrom India throughNext Generation Sequencing Technology (NGS) technology on illumina platform. Presently, our study focuses on X chromosome assembly and its annotation and mapping using D. melanogaster as reference. The sequence scaffolds belonging to the X chromosome were separated after being received the from the whole genome sequences using BLASTN. These scaffolds were structurally annotated using AUGUSTUS software. The total number of genes, cds and protein sequences were obtained and their names and functions were assigned using reference D. melanogaster. The mapping of the genes on X chromosome and their length and location wise analysis is on progress. The annotated results will be helpful in comparative genomics analysis of X chromosome across different Drosophila species and in understanding evolution of its functional genes.

Keywords: Indian Drosophila ananassae,Next Generation Sequencing Technology (NGS), X chromosome, gene annotation

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LUTEOLIN: A POTENTIAL INHIBITOR OF VEGF-INDUCED ANGIOGENESIS

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Abstract: Luteolin is a naturally occurring organic flavonoid, found in abundance in different plant species. Plants containing luteolin have shown various anti-inflammatory, anti-allergic and anti-cancerous effects. Luteolin plays a crucial role as an anti-oxidant. It scavenges the reactive oxygen species by oxidizing itself and also, inhibits the ROS-generating oxidases. The anticancer activity of luteolin includes apoptosis induction in tumour cells, inhibiting cell proliferation, metastasis, and angiogenesis. RT-qPCR and ELISA show the flavonoid displays inhibition of VEGF signalling pathway in the cells. VEGF, one of the most important signalling pathways, exerts cellular effects through tyrosine kinase receptors and VEGF receptors 1 & 2. Luteolin has the ability to lower down phosphorylation of VEGFR2 and thus, downstream the protein kinases. Furthermore, luteolin reduces the various inflammatory cytokines and TNF-α. It has shown to reduce in vitro cell viability and induced apoptosis in cancer cells. Lower concentration of luteolin shows VEGF suppression before the mediated loss of cell viability. Thus, this organic flavonoid is proved to be a valuable compound due to its therapeutic properties. Further because of its significant potential to interfere in VEGF signalling pathways, luteolin evidently shows inhibitory effects on pro-angiogenic proteins and therefore, it is a potential anticancer compound that would be an aid for progressive studies in the field of cancer. In this article we discuss the anti-angiogenic activity by luteolin against VEGF expression in cancer cells.

Keywords:Flavanoid, Luteolin, Anticancer, Angiogenesis, VEGF

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PARTICULATE MATTER AND ITS MOLECULAR MECHANISMS TO IMPACT HUMAN HEALTH SHUBHAM RAJPUT[1], MANYA SINGH[1], RACHANA R[1]*

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Abstract: Worldwide population has been associated with deleterious numerous health effects like: lung cancer, chronic obstructive pulmonary disease, myocardium infraction, ischemic stroke, and hypertension etc., due to environmental pollution. Over the last few years, the level of smog has increased all across the world resulting in the reduction of air quality. Air pollutants mainly consist of gaseous pollutants and particulate matters. Particulate matter (PM) is a complex mixture of particles and elucidated in terms of aerodynamic size as < 10 µm (PM10), < 2.5 µm (PM2.5) and ultrafine particles (UFP). Smog is basically caused by high concentration of fine particles (≤PM 2.5). Usually the particles < 10 µm have huge impact on human health. PM also contains various transition and Reactive Oxygen Species inducing metals such as nickel, chromium and various reactive lipid aldehydes (4-hydroxy-2-neonal and, malondialdehyde etc.), PAH which enhance carcinogen induced mutation.. Exposure to PM not only creates ROS, but also causes oxidative DNA damage. Due to the size and chemical composition, PM 2.5 and UFPs easily penetrate the thoracic region of respiratory system or through the pulmonary epithelium and enter into the blood stream or capillaries. Presence of UFPs in blood stream cause deleterious effects on cardiovascular system. In this article we discuss direct effect of particulate matter on cardiovascular system an in the inhibition in DNA repair and mutation.

Keywords: environmental pollution, chronic obstructive pulmonary disease), particulate matter, ultra-fine particles, reactive oxygen species), polycyclic aromatic hydrocarbons, cardiovascular system, DNA repair and mutation

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EXPLORING VARIATIONS IN DEGRADATIVE ENZYME PROFILE FOR CHOSEN RHIZOBACTERIAL ISOLATES AND THEIR CONSORTIA, WHEN CHALLENGED WITH PESTICIDE MONOCROTOPHOS

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Abstract: Employing rhizobacteria for remediation of organophosphate pesticides is a sustainable and emerging technology. Commercially no microbial formulations are available for remediation of organophosphate pesticides and thus become the target for present study. Pesticide degrading potential of microorganisms can be linked to their extracellular degradative enzyme milieu viz. OP hydrolases, esterases, phosphatases and oxygenases. These degradative enzymes biotronsform toxic pesticides into relatively safer compounds by cleaving the P-O, P-F, P-S and P-C bonds found in organophosphorus pesticides. Presence as well as the relative abundance of these degradative enzymes can be correlated with their tolerance towards pesticides. Four bacterial isolates RB1, RB2, RB3, RB4, three fungal isolates T101, T102, T103 and their consortia combinations
(12) were used in the study. LD50 values were found to be ranging from 900 ppm (for bacterial isolates) to 1500 ppm (for fungal isolates) of monocrotophos. As a prologue to make consortia, in vitro compatibility assay was performed with all test isolates. Out of twelve consortia combinations, five combinations that exhibited mutual competence were selected for the study. Estimation of degradative enzymes of all seven individual isolates and five consortia combinations was done in vitro both in monocrotophos (900 ppm) challenged and unchallenged conditions. Discernible differences were observed in their degradative enzyme profiles. Degradative enzyme profiles of these isolates are indicative of their suitability as bioinoculants for pesticide bioremediation.

Keywords: Degradative enzymes, Pesticide tolerance, LD50, Monocrotophos, Consortia, In vitro compatibility

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A STUDY ON AIR POLLUTANTS AND THEIR IMPACT ON PULMONARY DISORDERS

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Abstract: Airpollutionreferstothecontaminationofairduetothepresenceofsubstancesthatadverselyaffectthequalityoflife,humanhealthand thenaturalfunctioningoftheecosystem. Due to rapid urbanization and industrialization, air pollution is reaching alarming proportions and thus becoming a pressing environmental concern worldwide. According to WHO, more than 91% people inhabiting urban areas are exposed to air quality levels that exceed the WHO limits of safety. While major sources of air pollutants are vehicular, industrial and agricultural emissions, pollution due to domestic appliances, residential heating and cooking also contributes to the deterioration of overall air quality. Carbon monoxide (CO), ground level ozone (O3), particulate matter (PM), Lead (Pb), Sulphur dioxide (SO2) and Nitrogen oxides (NOx) are reported as the prime air pollutants. The study presents a concise view on the impact of various air toxicants on human health. The review especially focuses on the grave issue of the perpetual increase of air pollution and its impact on asthma, Chronic obstructive pulmonarydisease(COPD)andlungcancer.

Keywords: air pollution, air pollutants, asthma, COPD, lung cancer

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QUALITY IMPROVEMENT IN FRUIT JUICES USING ORGANICALLY SYNTHESIZED TANNASE AND PECTINASE

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Abstract: Demand for fruit juices is on the rise due to increasing health awareness and lifestyle preferences amongst people. Major concerns with commercial fruit juice production include: shorter shelf life, presence of tannins, pectin, cloudiness/haziness and so on, which affect the overall quality of fruit beverages. In order to address these problems, one can use enzymes synthesized by microbes. Treatment with specific enzymes would increase the release of various phenolic and other nutritionally important components in the juice. Appearance of fruit juice can also be improved due to enzymatic clarification. Fungus derived enzymes like tannase and pectinase have superior activity in degrading tannins and pectins present in fruit juices. In the present study, native fungal isolate Aspergillus carbonarius (F1) is being used for production of enzyme tannase and pectinase. The objective of the present study is to evaluate the improvement in fruit juice quality both in terms of physical properties (turbidity, yield, clarity, and colour change) and chemical properties (reducing sugar, acidity, phenol, pH, protein concentration and TSS), upon treatment with partially purified enzymes pectinase and tannase. Tannase and pectinase were synthesized by microbial fermentation of tannic acid from organic source. Crude extract of these enzymes was collected and further purification (partial) was performed by ammonium precipitation method. Estimation of different physico-chemical parameters was performed pre- and post-treatment of fruit juices with crude and partially purified enzymes. Enzyme treated fruit samples have shown improved quality parameters which are further explained in the research paper.

Keywords: Tannase, pectinase, enzymatic treatment, fruit juice, reducing sugar, fermentation

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FLORAL INFUSIONS AND THEIR HEALTH BENEFITS

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Abstract: Infusions are compositions involving tea and tea products mixed with various herbs. Major drawbacks with presently market available tea infusions are that they could lead to addiction,tooth decay and insomnia to some extent.This paper concerns with the development of floral infusions of four native indian seasonal flowers i.e. Clitoria ternatea, Rosa indica, Tagetes erecta and Jasminum sambac. Phytochemicals like alkaloids, flavonoids, phenols, tannins and vitamin C present in these flowers are known to contribute to stress relief, mind relaxation and immune boosting properties. Hence, infusions made from these flowers could offer multiple benefits due to the natural phytochemical and nutritive compounds present in them. Moreoevr, infusions from these are non-toxic, devoid of artificial dyes and preservatives which makes them a preferable organic option. The paper presents pharmacological and nutritonal benefits of hot and cold water infusions from the four listed flowers. Concentration of various phytochemicals and nutritive compounds was determined in these infusions and compared with locally available tea products. Based on results obtained, floral infusions can be considered as health and wellness formulations that can be easily incorporated in day to day lives as a regular beverage.

Keywords: Floral infusions; Stress relief; Tea based infusions; Immune boosting, Mind relaxing and nutrtional benefits.

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MICROBIAL BIODIVERSITY OF HIMALAYAN LIMESTONE ROCK AND METABOLITE FINGERPRINTING OF MICROMONOSPORA SP. RK-308

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Abstract: Emergence of multi-drug resistant pathogens has become a challenge in the management of microbial infections and requires novel drug discovery. Natural products from microorganisms of under explored habitats provide a suitable platform for novel antimicrobial products. The present study involves the characterization of microbial biodiversity (bacterial, actinobacterial and fungal) from under explored limestone rock of biodiversity rich Himalayas. All the isolates were characterized for antimicrobial activity, production of enzymes, siderophores and phosphate solubilisation. The isolates that showed broad spectrum antibacterial and antifungal activities were further identified by 16S rDNA sequencing. Amongst these, RK-308 was identified as being related to the rare actinomycete Micromonospora sp. and was further selected for characterizing its metabolites. Ethyl acetate and butanol extracts that showed maximum antibacterial and antifungal activities and against pathogenic clinical isolates were partially purified and the bioactive compounds were tentatively identified by GC-MS. Obtained compounds were analysed by using Simialrity index (SI), observed Retention indices (RI*) from databases (NIST11, WILEY8 libraries, PubChem and ChemSpider) and calculating Retention index (RI$). Results indicated that the selected habitat was bio diverse. A total of thirteen Streptomyces sp. RK-300, RK-302, RK-307, RK-309, RK-311, RK- 313, RK-314, RK-315, RK-316, RK-320, RK-321, RK-324, RK-326, two Nocardia sp. RK-310, RK-327, two Cupriavidus sp. RK-304 and RK-318, Nonomuraea sp. RK-312, and Micromonospora sp. were identified by 16S rDNA sequencing. All the isolates could be delineated to novel taxa (with the exceptions of RK-300, RK-302, RK-320, RK-321, RK-326 and RK-327). The consensus 16S rDNA sequence of RK-308 showed 96% similarity to M. mirobrigensis. Metabolite fingerprinting of the EA extract showed presence of novel compounds..

Keywords: Multi-drug resistance, antimicrobial, 16S rDNA, Streptomyces, GC-MS

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ROLE OF ROS1 GENE REARRANGEMENTS IN NON-SMALL CELL LUNG CANCER

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Abstract: Non-small cell lung cancers (NSCLC) includes adenocarcinomas which usually start from the mucus-producing cells in the lung and more frequently associated with pleural effusions and distant metastases.Literature reveals that the majority of patients had no history of smoking and had the histological features of adenocarcinoma and women were most commonly affected than men. Proto-oncogene ROS 1 gene has been found be majorly involved in causing NSCLC in 1-2 % of total 85 % of total NSCLC. ROS1, formally known as c-ros oncogene 1 codes for areceptor tyrosine kinase which is located on chromosome 6.ROS1 may get dysregulated due to mutations, overexpression, or gene fusion. Gene fusion can be a result of aberrant intra-chromosomal and inter-chromosomalrearrangements which is reported to take place at frequency in 1-2% causing these specific NSCLC cases. In these resultant rearrangement fusion proteins,the kinase domain of ROS1 becomes constitutively active and drives cellular proliferation. The fusions phenomena of the ROS1 gene has been found to be linked with variety of other cancers such as: Gastric cancer, Glioblastoma, Ovarian cancer and Colorectal cancer etc. as well. Few drugs known to treat other NSCLC have been found to be effective in these specific cases as well as, ROS 1 gene is structurally similar to ALK gene. One of FDA approved drug Crizotinib inhibits ROS1 rearrangement and has been found to increase the overall survival of the patients. To diagnose NSCLC, molecular analysis can be done by Florescence In-Situ Hybridization (FISH) technique and allows the detection of the majority of ROS1 gene rearrangements. The two methods including IHC and RT-PCR, have also been used to detect ROS1 rearrangement.In this article we discuss the importance of FISH technique in molecular diagnosis of ROS1 gene rearrangements.

Keywords: ROS1, ALK, NSCLC, Crizotinib, FISH.

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CELL PENETRATING PEPTIDES MEDIATED TRANSDERMAL DRUG DELIVERY

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Abstract: For several advantages like self-administration of the drug, avoidance of first pass hepatic metabolism, steady infusion of the drug for prolonged periods of time and majorly overall improvement in patient compliance, Transdermal route for drug administration has been chosen as an alternative to conventional drug delivery methods of oral and intravenous routes. But the transdermal route has its own issues of permeability due to the presence of Stratum corneum layer which acts as a functional barrier to the skin. So over the past few decades, the permeability of some potent drugs has now been improved with the use of Cell Penetrating Peptides which have the ability to cross the stratum corneum layer and hence allow the drug to reach systemic circulation. Cell Penetrating Peptides also known as Protein Transduction Domains have potential to deliver various cargos like nano-carrier drugs molecules, oligonucleotides, antibodies, toxins etc. across the cell membranes and thereby making the drug accessible to intra-cellular drug target. This review highlights upon various cell penetrating peptides like IMT-P8 and YARA and their efficiency to cross the stratum corneum layer to allow the drug to reach the systemic circulation when conjugated to specific proteins as the drug molecules.

Keywords: Cell Penetrating Peptides (CPPs), nano-carriers, trans-dermal delivery, stratum corneum

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KEFIR: CHARACTERISTICS AND HEALTH BENEFITS

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Abstract: Today the world has started bending towards healthier lifestyle, consisting healthy food. One such example is kefir which is a fermented milk produced from grains that comprise a specific and complex mixture of bacteria and yeasts. These organisms live in a symbiotic association with kefir. The basic procedure of making kefir is by adding a starter culture called "kefir grains" directly to milk. When several different bacteria and yeasts embedded in a complex matrix of protein & carbohydrate come together, there mass represents the kefir grain. Due to the complex fermentative process of kefir grains, initially kefir used to have 1-2% alcohol. But now new and improved production methods have resulted in much lower levels of alcohol. The factors which directly affect the nutritional composition of kefir are: the milk composition, the microbiological composition of the grains used, the temperature/time of fermentation and storage conditions. Due to its numerous beneficial effects on health, scientists today are more curious to find out more of this milk product. Upon consumption of kefir, it has been observed that the person have improved digestion and tolerance to lactose, antibacterial effect, hypocholesterolaemic effect, control of plasma glucose, anti-hypertensive effect, anti-inflammatory effect, antioxidant activity, anti-carcinogenic activity, anti-allergenic activity and healing effects. Lactic acid is produced by the microorganisms present in the kefir grains. Such products inhibit the proliferation of pathogenic microorganisms due to their antibacterial properties. The process of fermentation produces many different organic compounds like bioactive peptides, exopolysaccharides, bacteriocins. These compounds are a result of the associative growth of large number of microbial species in kefir, which are presumed to have a probiotic effect on human health

Keywords: Fermented milk, Probiotic, Kefir grains, Lactic acid, antimicrobial and inflammatory activity.

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ASSESSMENT OF COMPARATIVE PHYLOGENETIC STUDY OF CELLULASE FROM DIFFERENT HABITATS

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Abstract: Cellulases are a group of hydrolysing enzymes responsible for cellulose degradation and with wide industrial applications. While most studies focus on the biochemical and properties, information on their phylogenetic profiles is scarce. In this study, a comparative phylogenetic study of metagenomics-sourced data of cellulase gene sequences obtained from different habitats was conducted. Sequences of cellulase genes from microbial sources were extracted from literature and analyzed by comparing with available bacterial databases. Phylogenetic analysis was performed which helped in measuring the relatedness and distribution among different microbial sources producing cellulase. The results are discussed in this study.

Keywords: Cellulases, phylogenetics, metagenomics

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CRISPR-CAS9 TECHNOLOGY AND ITS USE: A REVIEW

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Abstract: With the advent of genome editing technologies , one of the powerful tool being highlighted these days is –CRISPR,that stands for- Clustered Regulator Interspaced Short Palindromic, repeats Its a most latest Gene editing technology in which the indel (insertion deletion) or replacement at a particular site in the genome of an organism (unicellular/multicellular) or a cell takes place. The technology mainly deploy the sort RNA and Cas9 to direct the nuclease proteins for complex eukaryotic gene/genome editing with accuracy and specificity and shown tremendous biological applications CRISPR system is of 3 types-Type I and Type III found both in bacteria and archae and Type II is unique to only bacteria. The type II CRISPR/Cas system is a prokaryotic adaptive immune response system that uses noncoding RNAs to guide the Cas9 nuclease to induce site- specific DNA cleavage. Generally the repeats are sort and palindromic in nature and regularly interspaced, whereby at the mechanism side the DNA damages are repaired at cellular level by deploying the non-homologous end joining DNA repair pathway (NHEJ) or the homology-directed repair (HDR) pathway Its actually the spacer sequence in between these repeats which play major role in CRISPR-cas9 technology and not the repeats but earlier scientists have no clue about these non-identical spacer sequence. Therefore the technology was named on the basis of repeats and not the spacer sequences. These spacer sequences are unique and non-identical which actually store the memory and not the repeats. One of its application is in Germ Line Engineering, where tt has a wide range of applications like- Used to cure inherited germ line diseases, human embryo edited, used to treat cancer but this technique is showing unpredictable results,used to improve IVF, altered plants are much more disease resistant also increased production is resulting in a wide ranging applications of this technology in plants , creating bio fuels, reviving extinct mammals,treating HIV etc.

Keywords: CRISPR/cas9, InDel, Genome Editing, Cancer.

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SUSTAINABLE WATER SUPPLY SYSTEM- GOAL ACHIEVEMENT WITH IOT

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Abstract: Water supply system is considered as one of the most important sources for the water to reach to the millions of people and places who require it for their survival. Sustainable development is what the nations are focusing upon these days. It is so because the concept of development alone cannot fulfils the needs of the current as well as of the future generations. Therefore, the concept of sustainability came in. The sustainable development path has many challenges in its way few of them being, increase in the water supply, decreasing fresh water resources etc. these problems can be tackled down with the help of the internet of things (IoT) technology application which can help in the big data collection. This collects data using the wireless sensor network technologies. The data can be either downstream or upstream. The downstream data provides water Usage and performance data to the clients and on the other hand, the upstream data is similar to the traditional automated meter reading. Both of the upstream and downstream data's are used in a combined form to identify local and system performances, quality of water etc. the development goal itself is to minimise the water usage by customers and making water usage more efficient. The same has been the area of the research.

Keywords: IoT, Water supply system, Sustainable Development, Bigdata

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LIPOFUSCIN PIGMENT ACCUMULATION IN BRAIN CELLS OF CATLACATLA AT MATURE AGE

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Abstract: Aging is the characteristics features of age dependent decline process. It is evidenced after adulthood and leads to disability and death, when optimal health, appearance and strength are at the apex. After maturity all physiological functions step by step start to decline. e. g. heart, kidney and maximum lung capacities are diminished. Physiological changes related with aging are inborn in all organism, representing highly complicated and multi factorial process involving simultaneously. Lipofuscin is a class of different polymers in different tissues exhibiting features chromophore fluorescent. Lipofuscin pigments accumulation in tissues has been defined by histochemical and organic solvent extraction methods. Lipofuscin pigment accumulation is increase with advancing age. To examine the increasing lipofuscin pigment in brain cells of mature Catlacatla, tissues samples were cut at 6 µ and stained with NileblueA,ferricferricyanide,stainedsectionswereanalyzedunderlightmicroscope.

Keywords: Lipofuscin, histochemical nature, Catlacatla, Brain, Nile blue A, ferric ferricyanide

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ADOPTIVE T-CELL IMMUNOTHERAPY: AN EFFECTIVE WAY TO FIGHT CANCER

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Abstract: Immunotherapy is a cancer treatment methodology used to fight cancer by enhancing the body's defense mechanism. Its main focus is to increase the efficiency of the immune system to recognize tumor cells and kill them. It works by reducing or stopping the proliferation of cancerous cells, by preventing the tumor cells from spreading to other body parts or by increasing the capacity of immune system to destroy tumor cells. Different types of immunotherapy that we have are monoclonal antibodies, oncolytic virus therapy, cancer vaccines and adoptive T-cell therapy. Adoptive T-cell therapy has evolved as a major breakthrough in the field of cancer treatment .The supportive reasons are that T cells have the potential to distinguish between normal and cancerous tissue, when activated they can undergo 1000 fold expansion, they have memory which prevents further proliferation of cancerous cells and they can traffic the antigen site to stop the disease from spreading in other parts of the body. In T-cell therapy approach, T-cells are taken directly from the blood of the diseased person after they have received cancer vaccination .These T-cells are then cultured in the laboratory to obtain a large number of the same which are then infused into patients that increase the overall ability of immune system to kill the tumor cells .Other forms of T-cell therapy includes growing tumor infiltrating lymphocytes ,using engineered T-cells to attack tumor or to culture a particular T-cell clone. Still whether immune system is fully successful in effectively controlling cancer is a subject of discussion and research but various studies and experiments show that adoptive T-cell therapy can treat cancer when applied in an accurate manner. In this article we discuss the potential of Adoptive T cells to fight cancer.

Keywords: Immunotherapy, monoclonal antibody, Adoptive T-cell, tumor infiltrating lymphocytes (LIT)

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CARTILAGE REGENERATION TECHNOLOGY IN OSTEOARTHRITIS: A REVOLUTIONARY DISCOVERY IN CELL THERAPEUTICS

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Abstract: Regenerative Medicine is an emerging branch in the field of tissue engineering and molecular biology. This branch aims to accomplish the proper functioning of damaged human cells, tissues or organs by either replacement or modification with the help of medical tools. It extensively uses stem cells or progenitor cells which increases the possibility of growth of the tissues and organs in vitro and leads to its implantation in the human body. Osteoarthritis (OA) is a disease which is observed in aged people which leads to progressive damage of articular cartilage. Due to the absence of blood vessels in cartilage, the regenerative capacity is lower as compared to other tissues. When an injury of cartilage takes place it results in activation of chondrocytes and growth factors are released into the matrix. The remodelling of matrix and regeneration process is controlled by the balance made between anabolic and catabolic responses taking place in the body. Stem cells have been used in the treatment of Osteoarthritis (OA) due to its high tissue regeneration capacity but its scope remains limited because stem cells have failed to fully recapitulate the mechanical and structural properties of the original tissue. Different techniques like Debridement or Abrasion, Micro fracture, or Osteochondral Autograft Transplantation Surgery, Periosteal Flap etc. have been developed to increase the success rate in the area of cartilage regeneration. In the present article we discuss different aspects of Cartilage Regeneration Technology in Osteoarthritis.

Keywords: Regenerative Medicine, Osteoarthritis, Debridement or Abrasion, Micro fracture, Osteochondral Autograft Transplantation Surgery, Periosteal Flap

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CHIKUNGUNYA: A RE-EMERGING EPIDEMIC

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Abstract: Chikungunya Virus (CHIKV) is a global public threat with its spread over 60 countries in Asia, Africa, Europe and the America. CHIKV is small, spherical, enveloped, positive-stranded RNA alphavirus having 3 genotypes: Asian, West African and Eastern/Central/South African. Since the major receptors are mainly present in the joints, which causes them to be ideal site for replication of CHIKV and hence these are more prone infectious site. According to the latest studies, Chikungunya infection occurs only once in a lifetime. The body develops protective antibodies that help to avoid the reoccurrence of the infection. It is not a fatal disease as its reported mortality rate is 1 in 1000. Until today, there has been no licensed vaccine available for Chikungunya. People over 65 years of age, neonates and the ones with chronic medical problems are most likely to have severe complications. Neonates are prone to vertical transmission of Chikungunya through their mother during delivery. Initial attempts for the development of CHIKV vaccine began in early 1960s. The treatment is mainly focused on relieving the symptoms. There are many antiviral drugs that have proven to inhibit the viral entry, replication or budding in model organisms. Studies of chimeric vaccine, completely inactivated vaccine, CHIK-IRES, virus like particle vaccine and neutralizing antibodies have been reported but none of them have yet been FDA approved. The success of these vaccines depends on the safety, immunogenicity, stability and cost. The best method to prevent infection could be overall mosquito control as well as avoidance of mosquitos' bites in the areas that are prone to Chikungunya.

Keywords: Antibodies; Antiviral; Therapeutics; Vaccine

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PURIFICATION OF DOMAINS OF CHIKUNGUNYA VIRUS ENVELOPE PROTEIN

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Abstract: Chikungunya virus (CHIKV) is among the most prevalent arthritic viruses causing significant morbidity on national as well as global scale. The high impact of CHIKV mediated illness on human health enforces the need for identification of drug targets and the rationale-based development of antiviral inhibitors. Among the nine CHIKV proteins, the envelope protein E2 aids in viral attachment, which is an indispensable component of the viral entry process. Owing to its biological and molecular functions, it is a promising target for the design of specific inhibitors. The inhibition of the interaction of this protein with host cell receptors will eventually prevent the CHIKV entry and thus infection. In this direction, we have expressed the important functional domain of CHIKV E2 protein in E. coli host and purified at large-scale as tag-less protein. The protein was successfully purified using three step chromatography, namely Affinity, Gel-filtration and Ion exchange chromatography. This purified protein carries a Biotin Acceptor Peptide (BAP) tag at its C-terminus and will be biotinylated using recombinant E.coli BirA enzyme to be used as bait for development of therapeutic agents as well as diagnostic applications.

Keywords: Affinity chromatography; BAP tag; Biotinylated protein; Domain purification; Ion exchange column; Therapeutics

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PLANT METABOLITES FROM ENGINEERED MICROORGANISM

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Abstract: Secondary plant metabolites are presently utilized in food industries for example: as colouring agents, seasoning agents or texturizing agents. Principally metabolites having opposed oxidative properties accommodate applications as preservatives or anti browning agents. In recent times, extraction from plant material signifies the vital supply of those metabolites however progress within the field of metabolic engineering additionally allow the microorganism production of those appreciated compounds as a additional economic and ecological possibility. The main target is on compounds that are utilized in food applications, as an example terpenoids (also referred to as isoprenoids that are shaped by cyclization of precursors of molecules), synthetic resin compounds (plant derived phenols). Microorganisms are proven to be vital platforms for the synthesis of those compounds, specifically bacterium, as an example C. glutamicum and Pseudomonas. Presently standard approaches are followed throughout metabolic engineering within which totally different genetic module for precursor's synthesis; production formation and merchandise diversification are functionally introduced into these platforms organisms.

Keywords: Secondary Metabolites, Microorganism, C.glutamicum, pseudomonas.

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TOXICITY OF METHYLENECYCLOPROPYL GLYCINE RESULTING IN HYPOGLYCEMIC ENCEPHALOPATHY: EXPERIMENTAL STUDIES IN WISTAR RATS

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Abstract: A major epidemic outbreak earlier known as Acute Encephalitis Syndrome (AES) has been known to occur since two decades, especially in Muzzaffarpur, Bihar, India, resulting in high degree of fatality, but only in undernourished children. Due to a strong spatial and temporal association between the disease outbreak and the litchi harvest zones in Vietnam, Bangladesh and Muzzaffarpur, we hypothesized that consumption of semi ripe or ripe Litchi fruits carrying a compound Methylenecyclopropyl glycine (MCPG) could be the probable etiological factor causing Hypoglycemic Encephalopathy in children. After ruling out the possibility of pesticide exposure and further identifying MCPG in the pulp of semi ripe (0.57 µg/g) and ripe (0.19 µg/g) litchi fruits, the toxic effects of MCPG were investigated in young Wistar rats. Control and starved rats were orally fed with MCPG (3.75 µg/kg bwt) for 28 days. Regular monitoring of the animal weights and their blood glucose were done, followed by neurobehavioural study on the 28th day of the experiment. It was found that exposure to MCPG significantly reduced the body weight and blood glucose in experimental animals falling to hypoglycemic levels (40-50 mg/dl). Moreover, MCPG treatment significantly altered the homeostatic levels of WBC count, neutrophils %, SGPT, SGOT, LDH, Triglycerides, CPKetc indicating toxic hypoglycemic effects in experimental animals. In addition, the neuro-behavioural studies along with the histopathological analysis of liver & brain from MCPG fed starved rats confirmed the toxicity. These results clearly suggest that it is the intake of MCPG through litchi fruit consumption, which stands as the main culprit behind hypoglycemic encephalopathy in Muzzaffarpur.

Keywords: Acute Encephalitis Syndrome, Methylenecyclopropyl glycine, Hypoglycemic Encephalopathy

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CANCER HALLMARKS AND NANOPARTICLE DRUGS: A STEP TOWARDS TARGETED DRUG DELIVERY

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Abstract: Cancer is the abnormal division of cells which hold the potential to spread across different parts of the body. This should not be mistaken with the benign tumor which unlike cancer don't invade the other areas of the human body. The available options of treatment for the same include: Chemotherapy, Radiation therapy and Targeted therapy out of which the latter being the most explored in the areas of clinical research. The complete cure to the disease still remains an unsolved mystery which can be solved with the intelligent and rational drug designing. Hallmarks of Cancer (HOC) providing the broader understanding about cancer symptoms are: vascularization, invasion, selective growth and proliferative advantage, metastasis, metabolic rewiring, immune modulation and ASR favoring overall survival. Targeted Drug Delivery is a method in which the medication is delivered to a patient in a way to increase its concentration in the required region of the body as compared to others. For the efficient working of this delivery system, nanoparticles and cancer hallmarks will act as the backbone. Due to their small particle size, nanoparticles are easy to reach the target organs/cells and at the same time help in reducing the toxicity of free drug to the non-target organs of the body. With immense knowledge about the symptoms and their nature, diseases like cancer may find their ultimate cure to heal millions of sufferers across the world. In this article we discuss different nanotherapies researched upon/available for the treatment of cancer.

Keywords: Chemotherapy, Vascularization, Metastasis, ASR (Altered Stress Response), Nanoparticles, Benign tumor, Nanotherapy, Targeted therapy

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PARTICULATE MATTER AND NEURODEGENERATIVE DISEASES: EVIDENCES AND MECHANISMS

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Abstract: Neurodegenerative diseases (NDDs) like: Parkinson's disease (PD), dementia, and Alzheimer's disease (AD) take place due to gradual and progressive loss of neural cells, leading to nervous system dysfunction. Environmental pollution has now being shown to be linked to NDDs. Particulate matter (PM) makes a major toxic proportion of the air pollutants. Notably, the two fractions of PM which predominantly affects the Central Nervous System are PM 2.5 and Ultra Fine Particulate Matter. They are acutely toxic to lungs, cardiovascular tissues and other body systems. If, the blood-air barrier of the lungs is crossed by them, they can attain access to the brain. Indeed latest research has already demonstrated that PM have major role in increasing the dysfunction of cellular organelles, inducing inflammation, and increasing oxidative stress. They can cause disturbance in protein homeostasis in neural cells which ultimately can result in neuron loss. Studies have been indicating that populations naturally exposed to polluted urban environments showed premature presence of diffuse amyloid plaques, exaggerated oxidative damage, and a significant rise in DNA damage (apurinic/apyrimidinic sites) in frontal, olfactory bulbs and hippocampus area. Lately, these studies have been approved and extended additionally to animal models and in humans, as well. In this article we discuss the neurotoxic mechanisms associatedwith particulate matter from air pollution.

Keywords: Particulate matter, Neurodegenerative diseases, oxidative stress, air pollution, PM 2.5

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IDENTIFICATION AND ANALYSIS OF TRANSPOSABLE ELEMENTS IN CANIS LUPUS

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Abstract: Canines have always been the interest to humans. Dogs, particularly, have emerged out to be a premier species for the study of behavior, morphology and diseases. Recent advances in the sequencing of this species have lifted the system to a new threshold. Having 31% repetitive DNA content (in dogs), it was discovered that Mobile Genetic Elements (MGEs) seems to play a considerable role in the evolution of the man's best friend. Here, we divulge that dog genome is occupied by MGEs such as ALUs, MIRs, LINE1, LINE 2, LINE 3, ERVL, ERV-class1, ERV-class II and other DNA elements including hAT Charlie and TcMartigger. Compiling the detailed description and genome wide distribution of MGEs present, we also provide an insight to the comparison of this genome with other species like humans and mice.

Keywords: Mobile genetic elements, LINEs, SINEs, ALUs, Gibbon, repeat masker

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EDIBLE BILAYER FILMS AND COATINGS UNDER GRAS LIMIT FOR FOOD PACKAGING

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Abstract: Since the consumer demand is increasing for foods with better shelf life, ready to eat, non-perishable (high quality) it has led to the development of several innovative techniques which would help in retention of their natural taste or colour. The most important element in these preservation concepts for providing the appropriate protection to the commodity is packaging. Scientists have proposed the edible films and coatings to replace the traditional synthetic packaging materials to prevent environmental pollution and ecological consciousness. Besides providing biochemical and physiochemical stability to the food they also have barrier properties and sensory characteristics. The study commences with the discussion of Edible Films and their components approved by FDA. The effect of polysaccharide based coating on the fruit strawberry was studied during cold storage where alginate, chitosan and pullulan were applied to the postharvest strawberry and their effect on firmness, decay rate, respiration rate, ascorbic acid content, titrable acidity, CAT and APX activity was observed. Besides polysaccharide, Lipids are also used as bio packaging material. Edible films act as carriers of various additives, such as antioxidants, antimicrobial, nutraceuticals, flavouring, colouring and crosslinking agents and thus they have great potential to deliver functional compounds to the food. The study involves the technique of Encapsulation of such bioactive compounds. Existence of synergistic behaviour between Plasticizers and Surfactants and its effect on the physical properties of Edible Films is also discussed. The study concludes with the methods used to evaluate the edible films based on their mechanical and barrier properties.

Keywords: edible films, bio packaging, polysaccharides, additives, encapsulation

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REMEDIATION OF OIL SPILLS

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Abstract : Oil is a mixture of hydrocarbon compounds, which are the decayed remains of marine animals and plants, died and drifted to bottom. It is the most important energy source in the world. Perhaps the paradox is that it is the same which causes severe impact on the environment. As the distribution of oil is uneven in the world, it is transported by ships across oceans and along pipes across lands. While transferring and drilling many oil spill accidents have taken place in past years. These oil spills cause damage to the environment to a great extent. It affects flora and fauna of the ecosystem and creates an imbalance between the habitat and organism. Thermal, Mechanical, Chemical methods to clean up have found to be disruptive, costly and labor intensive. Thus biological approach is considered which uses the natural ability of microorganisms and plants to render pollutants harmless. The biological approach includes Bioremediation, Phytoremediation and Biosurfactant. The bioremediation of oil spill can be done in two ways: biostimulation and bioaugmentation. The uses of these natural ways have been found to be cost-effective, environment-friendly. The effectiveness of each of these methods has been assessed in our research.

Keywords: Bioremediation, Phytoremediation, Biosurfactant.

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OPEN INSULIN PROJECT:THE BIO HACKED DRUG

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Abstract: With a rapid increase in the number of people suffering from diabetes across the globe, the price of Insulin available in the market is sky rocketing. Due to a gap of availability of insulin between patients and insulin production, many serious complications have emerged like rationalisation of insulin, diabeticketoacidosisetc. To decipher such thoughtful problems, a group of people termed as BIOHACKERS try to experiment and innovate with traditional medicines and devices. Biohackers are challenging complex intellectual property as well as regulatory aspect related with drug development in the United States (US). The latest example is an initiative termed as THE OPEN INSULIN PROJECT. The primary goal of this project is to reduce the price of insulin available in the market by competing with the big companies having patented protocol and enabling patients or small industrialists to yield generic insulin and personalised drugs by themselves. However, there are several barriers in the path of this dream project. Once this project succeeds in publishing an open protocol for insulin production there would be so many opportunities lined up next to work upon, counting 'home-brewed' insulin. It would be a tough challenge for Biohackers to come up with such futuristic ideas while not compromising with the safety of drug as well as empowering patients to make drug for their own use.

Keywords: Biohackers, Open Insulin Project, Diabetes, Drug development.

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MOLECULAR INTERACTORS FOR CHIKUNGUNYA VIRUS NSP2

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Abstract: Chikungunya virus (CHIKV) has re-emerged as one of the many medically important arboviruses that have spread rampantly to the world in the past decade. Infected patients come down with acute fever and rashes, and a portion of them suffer from both acute and chronic arthralgia. Currently, there are no targeted therapeutics against this debilitating virus. One approach to develop potential therapeutics is by understanding viral-host interactions. However, to date, there has been limited research undertaken in this area. CHIKV non-structural proteins are key players in viral life cycle as they form the replicase complex that synthesizes progeny viral RNA and are responsible for the cytopathic effects and host responses that are triggered by viral infection. nsP2 N-terminal is a part of RNA polymerase complex and has RNA triphosphatase and RNA helicase activity and its C-terminal section harbors a protease that specifically cleaves and releases the four mature proteins. nsp2 is involved in many important processes like host evasion and viral genome replication. Therefore by targeting the molecules that are interacting with CHIKV nsP2 can help in the drug development. Herein, the focus is on molecular interactions of host with CHIKV nsP2.

Keywords: arboviruses; arthralgia; cytopathic effect; interactors.

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IN-SILICO METHODS FOR PROTEIN-PROTEIN INTERACTIONS

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Abstract: Protein-protein interactions being one of the main research fields in the current functional proteomics play an important role in numerous processes in cell. Genes are the blue print for proteins. The complete sequence genome represents possible set of proteome in an organism while it does not provide the understanding of biological function. The progress in this field has effectively stimulated the progress for detecting the functions of the genes and their encoded proteins. Various insilico tools/methods have been developed to detect protein-protein interactions. The protein-protein interaction ranges from the sequence homology techniques to the genomic-context methods. It helps to integrate the data from different methods to build the protein-protein interaction network and further predicts the protein function from the analysis of the network structure. There are ongoing efforts to improve these methods to search for novel aspects in genomes. It offers various advantages in computational analysis such as flexibility, low cost and has high throughput ability. It also helps in detection of dynamic modules by integrating pair- wise molecular interactions occurring at different times and locations. Apart from computational method, we must also rely on the experimental studies to distinguish the differences and solve the ambiguities. Therefore, the strategy by combining the computational approaches and experimental methods will definitely accelerate the study of the protein protein network. It will also provide useful insights into the mechanisms of the biological processes in the organisms and enable us to understand the complexity of the life.

Keywords: Homology; network, proteomics

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MICROBIAL FUEL CELLS FOR SUSTAINABLE ENERGY PRODUCTION

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Abstract: In today's world, there is global energy crisis, with a high demand for renewable resources. A microbial fuel cell (MFC) is a promising source for producing clean energy to curb the world's increasing demand. MFC is a bio-electrochemical system that produces an electric current by using bacteria and copying bacterial interactions found in environment. A Microbial fuel cell mainly converts chemical energy, available in a bio- convertible substrate directly into electricity. To achieve this, bacteria are used as catalysts to convert substrate into electrons. A typical microbial fuel cell consists of anode and cathode compartments separated by cation specific membrane. Recent progress in microbial fuel cell technology has focused the potential of devices to be used as biosensors. The main advantage of MFC based biosensors is that they can be compact, relatively in- expensive and potentially disposable. The other application includes bio electricity which is utilized as power generator in small devices such as biosensors. This review deliberates the improvement of MFC's with summarization of their advantages in future application. The success of any technology depends on its commercial viability. Scaling up a MFC for mass application has to be marketed well amongst the public, with notable economic and environmental benefits communicated to the users.

Keywords: Microbial fuel cell, Biosensors, Electricity, Clean Energy, Renewable enegy.

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IN-SILICO INTERACTION STUDIES OF NEUROPEPTIDES TOWARDS CANCER THERAPEUTICS

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Abstract: Lung cancer is one the leading cause of death worldwide and where as non-small-cell-lung cancer (NSCLC) is main cause of lung cancer related to deaths with survival rate of 15.9% in 5 years. Pathologically, NSCLC is divided into 2 class squamous cell carcinoma and adenocarcinoma out of which squamous cell carcinoma can strongly be caused due to smoking habits, while the main cause of adenocarcinoma is the mutations in the set of driver genes mainly in EGFR,ROS1 and ALK. It is also reported that K-ras gene mutation exhibits resistance to EGFRs tyrosine kinase inhibitors.The cancer gene resistance, non-specific binding and toxicity of drugs have raised the challenges for the novel drug discovery. Peptides generally featured with high specificity, high biological activity, high membrane penetration and low toxicity etc. andhave been reported to exhibit their role as anti-Parkinsons as well as anti-cancerous.In this study we are focused on epidermal growth factor receptor (EGFR) a cell – surface receptor which is responsible for cell growth, differentiation and migration. Overexpression of EGFR is one of the main causes of human tumour of epithelial origin in different cancer types thus making it favourable target for drug delivery. We have performed in-silico interaction study between EGFR (PDB ID: 4I23) with known anti EGFR peptide (lytic peptide)achieving score of 11782 using computational tool. Similarlythe docking experiment was performed with EGFR with anti-Parkinson peptide (Secretogranin-1, Somatostatin, Prodynorphin, Cholecystokinin and their derivatives) and found to have protachykinin peptide (docking score 11416)as a promising result. The study can be extended with large dataset and molecular dynamics study.

Keywords: Non-small-cell-lung cancer (NSCLC), EGFR, Parkinson Disease, neuropeptides.

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ANTIMICROBIAL AND ANTIOXIDATIVE EVALUATION OF CITRUS SINENSIS AND CARICA PAPAYA PEEL EXTRACTS FOR TRANSDERMAL APPLICATION

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Abstract: The role of ethnomedicine in defining the traditional medicinal practices in different part of communities around the world has gained enormous admiration since many years, but still there is abundant medicinal flora which is not revealed yet. Though the nutraceutical properties of papaya and orange peel extracts as drug or quasi-food product are well understood and valued, but its applicability and suitability as a therapeutic agent is still questionable due to lack of valid scientific data. In our study we have focused on antoxidative and antimicrobial properties of Citrus sinensis peel(CSP)and Carica Papaya peel (CPP) extracts under optimized conditions for transdermal application and curing or healingskin infections. These extracts were analyzed for their antioxidant activity by DPPH and ABTS scavenging assay where CSP (DPPH= 98.7%, ABTS = 97.5%) exhibited better DPPH scavenging activity than CPP (DPPH=95.2% and ABTS= 95.0%).They were equally comparable with the standard too. The total phenolic content of the extracts was also determined and found to be 68.5µg/ml in CSP and 114.5 µg/ml in CPP. Also, the antimicrobial activity for the same against pathogenic bacterial strains of Micrococcus leuteus, Bacillus licheniformisand fungal strains Rhizopus oryzae, Asprgillusniger, and Trichoderma were found to effective and potent. These findings can form the basis for the studies to prepare an optimize preparation of the herbal extract.

Keywords: flora, antoxidative, scavenging

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PHARMACOGENOMICS & DRUG DISPOSITION: A REVIEW

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Abstract: Human population worldwide is reported to show variance upon administration of same medication. However, the level of variation is quite low in certain cases such as monozygotic twins or within closed population as compared to different demographical distributions. To much an amaze, drugs show different responses within the same patient'slife span. In an estimated report, around 20-95% of genetic variability causes drug disposition and associated effects. Certain non-genetic factors are also associated for such variation viz., age, organ function, drug interaction and nature of disease affecting drug target. At genetic level, various sequence variants in genes that encodes for drug-metabolizing enzymes, drug transporters, or drug targets are responsible for these inter-individual differences. Pharmacogenomics, which involves the interplay between genome and drug responses, helps us to understand the clinical responses such as pharmacokinetics and pharmacodynamics parameters in response with acquired or inherited genes. As per the studies, human genome consists of more than 1.4 million single-nucleotide polymorphism with more than 60,000 genes present in coding region. These single-nucleotide polymorphisms are often associated with the substantial changes in the metabolism.These are also helpful to predict clinical response as the interplay of several gene products determining most drugs effects. The presentreview workinvolvesanemphasisonvarioustherapeuticeffectsofinheriteddifferencesindrugdispositionanddrugtargets.

Keywords: drug-disposition, genome, genetic variation, Pharmacogenomics, Single-nucleotide polymorphism.

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BUTYRIC ACID: APPLICATIONS AND RECENT ADVANCES IN ITS BIOPRODUCTION

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Abstract: Butyric acid and its derivatives have various applications in chemical, plastic, dairy, food and pharmaceutical industries. Butyric acid and its derivatives are mainly used as solvents, drugs, plasticizers, perfumes, fibers, food additives and as raw materials. Commercial production of Butyric acid was usually done by chemical synthesis methods from crude oil as; it has less production cost and can afford a large scale supply. As, crude oil is not a sustainable source and the concerns over environmental protection are rising, world is now moving towards plants and microbial sources. The production of butyric acid by microbial fermentation had not been cost-effective as the yield obtained is low. But, due to the advancement in the area of biotechnology and microbial fermentation technologies it may now be possible to produce it at low cost from renewable biomass. Recently, various strategies have been developed to enhance Butyric acid production, which includes improvement and optimization in bioprocess techniques and metabolic engineering methods. In this review, we discuss various applications of butyric acid in industries and the recent advances for butyric acid production by microbial fermentation technique

Keywords: Butyric acid; Fermentation; Microbial fermentation; Renewable biomass

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OPTIMIZATION OF SOLVENT EXTRACTION STRATEGY AND QUANTIFICATION OF PLANT SAPONINS IN HERBAL FORMULATION OF CENTELLA ASIATICA

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Abstract: The recent trend of shifting the paradigm by global regulatory agencies like EMA and FDA towards 'single target-single compound' had been a concern for traditional medicines which are in use for decades. In developing countries like India, that are the hub of traditional medicines due to abundant bio-resource, lacking stringent guidelines are the growing concern which are making wide acceptance difficult. In current study, we explore the role of different solvents in extraction of saponin rich fraction from commercially available herbal formulation of Centella asiatica, used as reference standard. The extraction was performed in different solvents viz. aqueous, acetone, methanol, ethanol and ethyl acetate and chloroform; for 48 h with shaking at room temperature. Extracts were recovered; dried and equal amount was re-suspended in HPLC grade methanol. The choice of solvent was decided based on the reported amphipathic nature of saponins. Results showed comparatively higher saponin yield in the extract from acetone but the non-saponin fraction was also high. In comparison, methanol and ethanol showed marginally lower yield but also comparatively reduced non-saponin fraction. The change in the yield of saponin in solvent fraction may be a strategy for developing saponin rich extracts and evaluation of neuroprotective properties.

Keyword: Centella asiatica, saponin, extraction, formulation

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AGROBACTERIUM TUMEFACIENS MEDIATED GENETIC TRANSFORMATION OF GLYCYRRHIZA GLABRA: AN ENDANGERED MEDICINAL PLANT

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Abstract: An Agrobacterium tumefaciens-mediated transformation method has been developed for an endangered medicinal plant Glycyrrhiza glabra. Notable constituents isolated from licorice include flavaonoids, isoflavonoids, saponins, tripentenes and the most imperative is Glycyrrhizin. Glycyrrhizin, utilized mostly as sweetener and flavoring substance, it is reported to be used against various digestive system complaints including stomach ulcers, heartburn, colic, ongoing inflammation of the lining of the stomach (chronic gastritis) and suppress liver fibrosis and cirrhosis. In previous studies Highly efficient and reproducible callus induction protocol for Glycyrrhiza glabra has been developed using leaves segments as explant source. In present investigation two strains of Agrobacterium tumefaciens EHA105 and LBA4404 (harbouring pBI121 plasmid) were tried, strain EHA105 was found to be more efficient. Tissues were precultured on medium supplemented with 100 µM acetosyringone to increase transient expression of reporter gene (GUS). Co-cultivation period of 2 days and a bacterial density of 0.8 OD600 resulted in higher transient GUS expression. Regeneration of transformed shoots was achieved on Murashige and Skoog medium supplemented with BAP and NAA. Stable transformation was confirmed on the basis of GUS activity and PCR amplification of DNA fragments specific to uidA and nptII genes. This protocol will be used further for cloning and over expression of gene Cytochrome P450 monooxygenase CYPD886 to elevate Glycyrrhizin production.

Key words: Transformation, cloning, Co-cultivation, callus induction, GUS expression.

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ANALYZING NANOMEDICINE LETHALITY IN CENTRAL NERVOUS SYSTEM DISORDERS: LOOK AHEAD

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Abstract: The rise of Nano medicine approach in health care setting has provided a flexible and targeted platform for many uncurable/least curable medical conditions like –cancer, neurodegenerative disorders, etc. Due to many pharmaceutical limitations like low solubility in water and the human body, sometimes absorption is well but it didn't have enough stay period or unwanted effects due to insufficient delivery at the targeted site of disease, many therapeutically potential drugs struggles to soak up enough to care for the condition. In today's scenario, nano medicines are used globally to improve the treatments of patients suffering from a variety of ailments such as ovarian and breast cancer, renal failure, fungal infections, elevated cholesterol, menopausal symptoms, multiple sclerosis, continual pain, asthma and emphysema. The currently available nano medicines in commercial markets have proved to be more efficacious and viable in comparison to their conventional counterparts. Considering their large surface-to volume ratio, higher flexibility for surface sourcing, and great capability for multifunction, nanoparticles have shown lots of benefits such as improved medications, emerged as a promising carrier for co delivery of accurate solubility, controllable release of drugs, decreased systemic toxicity and issues of conventional combination therapy. Although most of the nano medicine preparations available are fabricated by the biodegradable products but the inorganic nanoparticles which are relatively more non biological in nature, are found to be comparatively more stable on varied temperature and pH ranges, incrementing the concerns related with their non-compliance in biodegradation after the drug delivery. Therefore, if these non-biological materials are consumed, then they should be safely exited from the body or should stay in a stable and uninterrupted form within the body. In this paper we have raised the alarming concerns related with the development and delivery of nanomedicine at the targeted site.

Keywords: Therapeutic potential, biodegradation, inorganic nanoparticles, polymeric nanoparticles, cellular toxicity.

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MEDICINAL PLANTS IN THE TREATMENT OF NEUROPATHIC PAIN: A REVIEW

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Abstract: Neuropathic pain is a complex, chronic pain state that occurs due to the injury of a tissue and/or damaged nerve. This important health issue is still a challenge for the modern medicine worldwide. Although there are a large number of available drugs, but no substantial curative conventional treatments are available for it. This is due to lack of understanding of pathophysiological mechanisms of neuropathic pain. Drugs like opiates, tricyclic antidepressants, and antiepileptic agents are the various classes of drugs that have been reported to be effective for the management of the neuropathic pain. However, thesedrugs have been observed to have adverse effects thus, this hinders their confident prescription in people with pain due to damaged nerve.Nowadays, traditional plant treatments have been used throughout the world for the treatment of neuropathic pain. Various medicinal plants like Citrulluscolocynthis, Curcuma longa, Crocus sativus, Elaeagnusangustifoliaand many more have been observed to cure and control neuropathic pain with no side effects. So, it may be well advised to look beyond synthetic drugs and switch to the plants having medicinal properties that have unusualpharmacotherapeutic effects with lesser adverse effects. Furthermore, the pathways which are known to be involved in pain relief by means of herbal remedies are anti-oxidant activity, anti-inflammatory, anti-apoptotic, neuroprotective and calcium inhibitory actions. In conclusion, this review discusses the plants like Papaver somniferum, Capsicum, Tripterygiumwilfordii, Camellia sinensis, and Ananascomosus with neuropathic pain and related beneficial effects originating from different parts of world.

Keywords: Anti-apoptotic, Anti-inflammatory, Anti-oxidant activity, Neuroprotective, Neuropathic pain, Pharmacotherapeutic

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CURCUMIN AS A POTENTIAL MOLECULE IN CARDIO-ONCOLOGY

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Abstract: Anti-cancer drugs induced cardiotoxicity has emerged as an important factor for cardiovascular complications. This majorly limits the overall cancer treatment efficiency, as patients recover from one cancer but develops cardiovascular complications in the longer run. There is an urgent need for developing therapeutic interventions for reducing anti-cancer drug induced cardiotoxicity without compromising the drug effects. Cardio-oncology is a new emerging field where the cardiac health of cancer patients is also a prime concern of oncologists. Nowadays, there is a growing interest in natural bioactive compounds for reducing drug induced side-effects by supplementing with natural cardio-protective compounds. In the present study, synergystic cardio-protective effects of Curcumin were studied in vivo against Doxorubicin (Dox) mediated cardiotoxicity using male Sprague Dawley rats. Body mass index studies and serum specific biomarker analysis was done. Different biomarkers for cell death and survival were analyzed using real-time PCR and western blotting at transcriptomic and proteomic levels by expression studies. We observed that Dox treatment significantly resulted in overall decrease in body weight, heart weight and size. Curcumin pre-treatment displayed reversal of these effects. Curcumin treatment also significantly reduced Dox induced LDH, MDA and catalase expression in blood serum. This was validated by gene expression studies of caspase 3, catalase and TNF-α. Curcumin mediated significant reduction in drug mediated toxic effects were observed by altering cell death and survival pathways in vivo. In conclusion, pre-treatment of Curcumin can suppress the Dox induced cardiotoxicity in vivo and hence, holds a great potential as future cardio-oncological therapeutics.

Keywords: Curcumin, Doxorubicin, cardiovascular diseases

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PROTECTIVE EFFECTS OF CURCUMIN AGAINST NOREPINEPHRINE INDUCED CARDIAC STRESS

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Abstract: Drug induced toxicity has emerged as an important cause of developing cardiovascular diseases (CVDs), where, both cardio- as well as non-cardiovascular drugs play an important role. Norepinephrine (NE) is a neurotransmitter and a stress hormone which plays an important role in CVDs. It is commercially prescribed as Levophed for treating hypotension, and widely used in critical care patients. Being a neurotransmitter, its concentration itself increases significantly in stress conditions and administration of levophed results in developing CVDs. As, the clinical application of NE cannot be avoided, measures for reducing the induced toxic effects should be developed. There is a growing interest in naturally occurring compounds for improving the therapeutic index of cardiotoxic drugs. Present in vivo study was designed to explore cardio-protective efficacy of Curcumin, a polyphenol isolated from Curcuma longa, in relation to NE-induced cardiotoxicity. To validate the cardio-protective effects of Curcumin in NE induced cardiac stress, expression analysis of cell survival and death markers were studied at transcriptomic and proteomic levels in vivo where male Sprague Dawley rats were induced with NE and Curcumin. NE treated rats displayed significant increase in overall body weight, heart weight and size representing characteristic hypertrophy. These effects were restricted in Curcumin treated rats. Expression studies by western blotting and Real-time PCR for apoptotic, pro-apotic, oxidative stress and inflammatory markers and the Curcumin mediated effects were validated. Expression of β-MHC, TNF-α, catalase and Bcl2, biomarkers for hypertrophy, inflammation, oxidative stress and apoptosis respectively. Curcumin reduced NE induced deleterious effects by modulating gene expression of hypertrophic, oxidative and apoptotic biomarkers in vivo. Hence Curcumin significantly reverses NE induced cardiac stress and holds potential for developing therapeutic interventions for NE induced cardiotoxicity.

Keywords: Curcumin, cardiotoxicity, cardiovascular diseases

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OPTIMIZATION OF CULTURAL CONDITIONS FOR PECTINASE PRODUCTION FROM ENDOPHYTIC BACTERIA

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Abstract: Enzyme covers a massive market in today's world, in different sectors. On the other hand pigments are also demanding product in the market, especially in cosmetics and food industry. Solvent extracted plant pigments tend to oxidise, dissociate from proteins and its colour is water insoluble Whereas if then the isolated pigments colour is stable and pigments do not oxidise.Utilizing enzymatically isolated pigments from natural sources over the chemical one is more safe and cost effective too. Endophytic communities of Colocasia esculenta , Ipomoea batatas, Amorphophallus paeoniifolius (Elephant foot yam) were screened for their ability to produce pectinase . Three pectinase producing endophytic bacteria Exiguobacterium indicum ; Exiguobacterium acetylicum Staphylococcus sciuri were subjected to various pH (4 to 12) and media with variable nitrogen and fixed carbon sources for optimization of fermentation conditions so that cost-effective pectin degrading enzyme can be isolated which can find application in safe pigment isolation.

Keywords: Enzyme, Pectin, Pectinase, Pigment.

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GROWTH ENGINEERING AND BIO-FILTRATION EFFICIENCY OF GREEN SEAWEED IN AQUACULTURE WASTEWATER

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Abstract: Bioremediation of aquaculture waste using seaweeds as nutrient scrubbers and oxygenators provides good alternative and cost-effective, conventional treatment systems. In present study, we evaluated the growth engineering of green seaweed sp. Monostroma in aquaculture wastewater (AWW) collected from Shrimp farm from Palghar district of Maharashtra. The AWW showed pH of 7.62, Salinity in ppt: 15, total N:
13.83 mg/L and total P: 0.42 mg/L. In artificial light, the DGR (%) of Monostroma sp. at different density (0.25 to 1 g/L of seawater) ranged from
3.78 to 17.84% with optimum at 0.250 g/L. Similarly, the DGR (%) in different light intensity (3000 to 12000 lux) ranged from 4.66 to 15.18% with optimum at 9000 lux. The optimized growth conditions were further used to grow seaweed sp. in the AWW. The DGR (%) of Monostroma sp. in AWW (in artificial light) was found to be 18.60. The culture of this sp. was further taken to environmental chamber (natural sunlight) for further growth studies. The DGR (%) of this sp. at different density of 0.25 to 9 g/L was found to be in the range of 7.12 to 18.48% in 4 days at sunlight intensity of app. 1900 - 50000 lux (morning to evening). After 4th day the reduction in total N (40-70%) and total P (26-40%) was observed. Further the growth of Monostroma sp. for 12 days showed DGR of app. 17%. All the growth experiments were carried out in AWW without addition of external nutrients. The proximate analysis of harvested biomass from the AWW has moisture content; 78-80% (FW), ash content; 22-25%, protein; 11.5-21.4%, carbohydrate; 12-51% and lipid content of 1-4% on dry weight basis. Interestingly, the DGR (%) and proximate composition of biomass grown in natural irradiance varies with the time period and intensity of sunlight.

Keywords: Seaweeds, Bio-filtration, Daily growth rate: Proximate composition

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EXPLORING THE ANTI-CANCER TARGETS OF PUNICA GRANATUM IN SKIN CANCER

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Abstract: The anti-inflammatory and antibacterial activities of Punica granatum have been well documented and nowadays their anti-cancer activity is also being explored. Pomegranate seed oil has turned out to be beneficial in case of skin and breast cancers. It has phytoestrogenic compounds and the fruit itself has abundant phenolic compounds which have strong antioxidant activity. Their inhibitory effects have been demonstrated on enzymes such as: ODC, COX, LOX, 17β-HSDs cytochrome P450, and serine protease. They have been found to interfere with several signaling pathways involved in skin cancer like: MAPK, ERK1/2, P38, JNK, caspase, and activation of AKT stimulated by TNF-α, useful for NF-κB activity. Stimulation of cell differentiation and anti-mutagenic effects are also exhibited by them. The objective of this article is to explore the different anti-cancer targets of Punica granatum in skin cancer.

Keywords: Punica granatum, phenolics, skin cancer

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BIOLOGICAL PATHWAYS AND DISEASES

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Abstract: Biological pathways are essential for various activities of cell like metabolism, regulation of genes and in the transmission of signals. Human diseases involve abnormal metabolic states in which usual body process disrupted, which is a heart of some serious health problems. Biological pathways can be regulated by the need of the cell. The metabolism of a cell consists of elaborate network of interconnected pathways that enable the synthesis and breakdown of the molecules. Biological pathways have been recognized as potential targets for various diseases because of the involvement of genes, proteins and other molecules. There can be accumulation of toxic substance or absence of important product due to disturbance in any step of the pathways. Therefore, identification of the pathway and its particular step can help us to develop effective drug molecule. There is an urgent need to understand more about the biological pathways as they are interrelated with each other and provide various ways to combat diseases. Present review aims to study the relationship of biological pathways with different diseases.

Keywords: Pathways; Diseases; Genes; Protein

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CHIKUNGUNYA VIRUS: LIMITATIONS IN CURRENT THERAPEUTIC APPROACHES

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Abstract: In the last few decades the Chikungunya virus (CHIKV) has evolved from a geographically isolated pathogen to a virus that is widespread in many parts of Africa, Asia and has also recently been detected in Central-and South-America. Although CHIKV infections are rarely fatal, the disease can evolve into a chronic stage, which is characterized by persisting polyarthralgia and joint stiffness. This chronic CHIKV infection can severely incapacitate patients for weeks and even up to several years after the initial infection. Despite the burden of CHIKV infection, no vaccine or antivirals are available yet. The current therapy is therefore only symptomatic and consists of the administration of analgesics, antipyretics, and anti-inflammatory agents. Recently several molecules with various viral or host targets have been identified as CHIKV inhibitors. In this review, we summarize the current status of the development of antiviral strategies against CHIKV infections.The current status along with limitations of antiviral therapy is reviewed, including discussion of older approaches together with more recently developed chemotherapy. The pathophysiological aspects of virus disease and the different approaches to antiviral therapy are presented. The reasons for the slow progress in antiviral therapy are discussed. These include the necessity of intracellular penetration of drugs acting on viral replication, the severe toxicity of most antiviral drugs, the narrow antiviral spectrum of most of these agents, the difficulty of making a rapid etiological diagnosis in view of the necessity of starting treatment early in the course of the disease and the difficult evaluation of beneficial as compared with deleterious effects of antiviral therapy.

Keywords: Chikungunya virus, polyarthralgia, chemotherapy.

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MICROFLUIDICS: A TURNING POINT IN POINT-OF-CARE DEVICES

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Abstract: Microfluidics has revolutionized the laboratory devices and in particular biosensors technology by enabling high-throughput processing, mass transport and mixing of different reagent on the same chip. Furthermore, microfluidic based devices are attracting attention as a cost effective, user friendly and sensitive device allowing analysis of micro or nanoscale sample volumes with high sensitivity and specificity. In this review we present different POC devices developed through integration of biosensor and microfluidics. Finally, we have discussed some of the considerations and major challenges faced during microfluidic device fabrication and its integration to biosensing platforms.The development of portable biosening devices for the detection of biological entities such as biomolecules, pathogens, and cells has become extremely significant over the past years. Scientific research, driven by the promise for miniaturization and integration of complex laboratory equipment on inexpensive, reliable, and accurate devices, has successfully shifted several analytical and diagnostic methods to the submillimeter scale. The miniaturization process was made possible with the birth of microfluidics, a technology that could confine, manipulate, and mix very small volumes of liquids on devices integrated on standard silicon technology chips. Such devices are then directly translating the presence of these entities into an electronic signal that can be read out with a portable instrumentation. For the aforementioned tasks, the use of magnetic markers (magnetic particles—MPs— functionalized with ligands) in combination with the application of magnetic fields is being strongly investigated by research groups worldwide. The greatest merits of using magnetic fields are that they can be applied either externally or from integrated microconductors and they can be well- tuned by adjusting the applied current on the microconductors. Moreover, the magnetic markers can be manipulated inside microfluidic channels by high gradient magnetic fields that can in turn be detected by magnetic sensors, making this technology an ideal candidate for the development of such microfluidicbiosensors.

Keywords: Microfluidics, biosensing, microconductors.

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STRUCTURE BASED VIRTUAL SCREENING OF NOVEL INHIBITORS AGAINST NON STRUCTURAL PROTEIN NS5B OF HEPATITIS C VIRUS

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Abstract: Hepatitis C Virus (HCV), a complex liver virus is the cause of acute and chronic Hepatitis in humans. Rapid mutations help virus to survive by selecting variants which are resistant to currently used anti-HCV drugs pegylated interferon-a (PEG IFN-a) in combination with nucleoside analogue Ribavirin, but which have significant side effects. Therefore there is a pressing need to look for new anti-HCV compounds with high therapeutic index, reduced side effects, and a convenient route of administration. In recent years, virtual screening has provided an effective, time and cost efficient way to screen large number of potential inhibitors. Drug repurposing or repositioning explores obsolete or currently used drug molecules for different disease conditions than their identified uses, which reduces the cost of the drug discovery process and reduces the time line for the whole process of new drug discovery significantly. Non structural protein, NS5B of HCV is a potential target as it is an RNA Dependent RNA Polymerase involved in viral replication. Based on the available literature, certain conserved sites exclusively present in HCV and fundamental to the functioning of NS5B polymerase were selected, primarily in Indian strains (3a & 1b) and sixteen exclusive residues marked out. Alignments were done using ClustalW software to confirm their presence in genotypes 1b and 3a and others. Using a library of 2924 FDA approved drug molecules, docking was done on each target site, using the docking software "FlexX", which accurately predicts protein-ligand complexes and estimate the binding strength. The docking results were very promising particularly GTP binding site involving residues Arg158, Ser282, Arg394 showed stable binding with inhibitors and suggest that NS5B is a potential target. Several promising leads were recognized which could be further explored for therapeutic intervention in HCV infection.

Keywords: Hepatitis C Virus, FDA approved drug, docking, NS5B.

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