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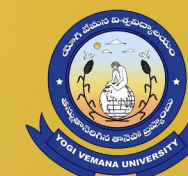
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Keynote & Plenary Speakers

Past, Present, and Future of Bioenergy: An Example of Butanol

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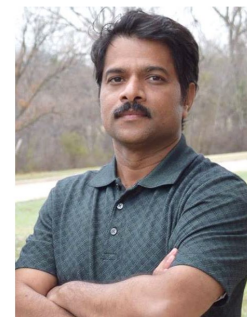
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The importance and history of butanol production from renewable resources comes second to ethanol. During World Wars I & II (WW I & II) there were butanol production plants in the world including United States, Brazil, Taiwan, South Africa, and India. In this process acetone butanol and ethanol (ABE) are produced by microbial fermentation with butanol being the major product. During these Wars, butanol fermentation was operated to produce acetone, a strategic chemical to make cordite a smokeless gun powder. After WW II microbial fermentation of butanol (MFB) ceased operation mainly due to development of petrochemically produced butanol (PPB). The PPB was produced economically as compared to MFB. The last plant (South Africa) that used renewable feedstock was shut-down in 1983. As a result of oil embargo of 1973 and its depleting resources, research in this direction was initiated in 1980s. Studies focused on the use of economic feedstocks such as agricultural residues (wheat straw, corn stover, miscanthus, rice straw, food waste, yellow top seed press cake etc.), development of high productivity reactors including immobilized cell and membrane cell reactors, energy efficient novel product recovery techniques, and genetically engineered microbial strains. Currently, significant advances have been made in this directions. Economic studies suggest that butanol can be produced at \$0.42-0.79 kg⁻¹. It is expected that use of agricultural residues with high productivity reactors, energy efficient product recovery technologies, and novel microbial strains would make commercial production of butanol biofuel a reality. It is emphasized that butanol can be used as a transportation biofuel in automobiles without making any major changes to the engines. This presentation covers microbiology, biochemistry, food technology, and chemical engineering involved in the production of butanol biofuel.

Influenza Virus Pathogenesis and Therapy

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Unpredictable and frequent outbreaks of influenza viruses with high mortality rates represent a major public health problem. Both virus- and host-mediated factors contribute to influenza virus pathogenesis. A common cause of death in severe influenza is acute respiratory distress syndrome (ARDS), recognized by a unique pattern of pathologic characteristics, including alveolar-capillary damage, edema, pulmonary hemorrhage, microvascular thrombosis (MT) and impaired gas exchange. Widespread coagulation effects with extensive pulmonary vascular thrombosis are found in fatal influenza infection, but the factors contributing to these pathologic events are not completely understood. Our studies have demonstrated that excessive neutrophils recruited during influenza pneumonia contribute to severe lung pathology through induction of neutrophil extracellular traps (NETs) and release of extracellular histones (ECH). The released ECH act as damage-associated molecular patterns (DAMPs) and trigger cytotoxicity, thrombosis and organ failure. We found that ECH accumulated in infected-lungs exacerbate pulmonary pathology by triggering alveolar-capillary injury and inducing MT. Increase in ECH levels were also found in nasal wash samples collected from influenza-infected patients. We have recently shown that activated platelets interact with infiltrated neutrophils forming neutrophil-platelet aggregates (NPAs), which contribute to tissue injury. I will discuss on neutrophil-induced acute lung pathology in severe influenza pneumonia.

**Polysaccharide based polyelectrolyte complex
hydrogels for biomedical applications**

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Global research on polyelectrolyte complexes (PECs) at a fundamental and applied level is intensifying because the advantages of sustainability are being accepted in academia and industrial research settings. During recent decades, PECs became one of the most attractive subjects of scientific research owing to their great potential in the areas of advanced biomedical technologies. PECs are a type of polymer that have multitudinous ionizable functional groups. Ionized polyelectrolytes in solution can form a complex with oppositely charged polyelectrolytes - a PEC. Moreover, the PECs combine unique physicochemical properties with high biocompatibility. The present talk will be discussed on the formation of polysaccharide based polyelectrolyte complex hydrogels via in-situ approach using chitosan and xanthan gum biopolymers. Further, the final properties will be discussed by the incorporation of nanofillers such as silver nanoparticles, magnetic nanoparticles, cellulose nanocrystals, halloysite nanotubes for possible applications in tissue engineering as well as drug delivery applications.

Key words: Polysaccharides, polyelectrolyte complexes, hydrogels, nanofillers, tissue engineering, and drug delivery.

**Tumor Treating Fields: New modality of cancer therapy.
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TTFields is a novel non-invasive physical modality of cancer therapy now approved for recurrent and newly diagnosed glioblastoma multiforme (GBM) in combination with temozolomide, and unresectable locally advanced or metastatic malignant pleural mesothelioma (MPM) in combination with platinum based chemotherapy. Clinical trials are ongoing for other cancers, including lung, pancreatic, and ovarian cancers. TTFields are low-intensity, intermediate frequency, alternating electric fields that are applied to tumor regions and cells using non-invasive arrays. One mechanism described for TTFields induced cell death has been via the disruption of mitosis while a more recent examination suggests that TTFields causes replication stress, and down-regulates DNA repair and cell cycle checkpoint genes. However, the exact cause of the downregulation of DNA repair and cell cycle checkpoint genes has been elusive. To that end, we employed relative quantitative proteomic analysis using tandem mass tags (TMT). STRING DB analysis of differentially expressed proteins revealed interaction networks that included cell cycle, DNA damage repair and replication, and transcriptional and translational regulation. Upstream analysis of key genes associated with cell cycle checkpoint and DNA repair identified reduced expression of the transcriptional activators E2F1 and E2F2 and increased expression of the transcriptional repressor E2F6, suggesting that TTFields affects the CDK-RB-E2F axis. Therefore, TTFields was combined with the E2F inhibitor HLM006474 with or without the CDK4/6 inhibitor abemaciclib. TTFields in combination with either inhibitor enhanced cell killing synergistically, as compared to TTFields alone, while the triple combination was found to be highly lethal (>90% by 72 h) as measured by clonogenic assay followed by the Highest Single Agent approach to determine synergy. Taken together our results identify the CDK-RB-E2F axis as a novel druggable target that can be used in combination with TTFields for cancer therapy.

**Nanomaterials in bioanalytical applications:
Detection, Imaging and Drug delivery**

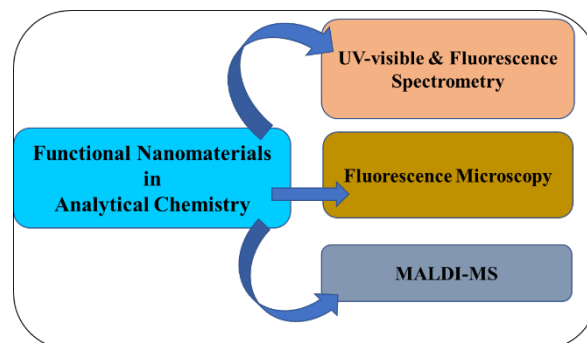
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Nanomaterials are becoming an integral part of all application-oriented research that is being carried out in multidisciplinary areas [1]. Functional nanomaterials have shown significant impact in bioanalytical chemistry for the detection and imaging of target analytes [2-3]. The integration of functional nanomaterials with analytical techniques provides a facile way to detect target analytes even at single molecule level. Recently, analytical chemistry has progressively changed in molecular recognition and imaging because of outstanding properties of functional nanomaterials, suggesting the analytical tools are benefitted due to the unique optical and photophysical properties. Similarly, functional nanomaterials were also used as carriers for drug delivery and as probes in matrix-assisted laser desorption/ionization mass spectrometry (MALDI-MS) for the analysis of biomolecules. The integration of fluorescent nanomaterials with fluorescence microscopy provides a simple protocol for imaging of target cells without use of any dye molecules. The overall aim of talk is to demonstrate applications of functional nanomaterials in UV-visible and fluorescence spectrometry, fluorescence microscopy and MALDI-MS for the detection and imaging of target molecules. The functional nanomaterials act as carriers for the delivery of various drugs and provides a simple platform to visualize the drug molecules. The functional nanomaterials-based analytical techniques showed good selectivity towards target analytes and offered impressive limit of detection for various target molecules, which can be visualized with naked-eye and measured by UV-visible/fluorescence/MALDI-MS techniques.



PGPR and phytomicrobiome for enhancing sustainable agriculture

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Due to green revolution, high yielding varieties and imbalance chemical fertilizers, and pesticides are used continuous for enhancing productivity to feed growing population. This agrochemical is causing the serious problem for increasing soil water and air pollution, and major problem is the loss of beneficial microbial flora and fauna in soil to decrease soil health. Other problem is causing the nutritional deficiency diseases, diarrhea, headache, neurological disorder, cancer, heart attack and skin disease etc. Therefore, sustainable agricultural and organic farming practices are the best alternative practices for improving nutritional quality, crop productivity and re-charging soil microbial flora and fauna as well as enhancing soil health. The application of biofertilizer/bio-inoculants/bio-controlling agent or indigenous microbial consortia is one of the efficient technology and practices for boosting agricultural productivity. Presently, plant growth-promoting rhizobacteria (PGPR) and phytomicrobiome (endophytic microbes, whole microbial community of plant) may be used as effective biofertilizer or microbial consortium for enhancement of nutritional quality and productivity. PGPR and phyomicrobiome have ability to work through mechanism of direct (N_2 -fixation, nutrient solubilization, production of plant hormones, ammonia and siderophores) and indirect (antibiotic and chitinases for bio-controlling of phytopathogens). As per many research literature on PGPR (*Pseudomonas*, *Azospirillum*, *Azotobacter*, *Klebsiella*, *Enterobacter*, *Alcaligenes*, *Arthrobacter*, *Burkholderia*, *Bacillus* and *Serratia*) have been reported to enhance nutrient content and yield of food crops. Recently, phytomicrobiome is totally new terminology come in picture similar to human microbiome/gut microbiome which has explored by use of metagenomics technique and next generation sequencing tool except very limited research on their culturing aspect (endophytes) for consortium development and synthetic consortium as bio-inoculants. These microbial consortiums can be used as best practices for enhancing sustainable agriculture and this will be environment friendly, economically viable and socially acceptable.

Key words: Green revolution, Plant growth rhizobacteria (PGPR), phytomicrobiome, Sustainable Agriculture, productivity

Iron-reducing-bacteria from South China Sea Marine Environments

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Iron reducing bacteria (IRB) play significance roles in iron geochemical cycles. IRB are capable of reducing Fe(III) to Fe(II) for energy conservation and thrive in both freshwater and marine aquatics environments which are abundance with Fe(III) oxides. In this study, we isolated and identified IRB from three South China Sea marine environments which represent three different marine ecosystems (brackish water, coastal marine ecosystem, and ocean floor benthic ecosystem). Sediment samples were enriched in minimal medium supply with Fe(III) hydroxyoxide (FeOOH) as the sole electron acceptor and lactate as the sole electron donor. The enrichments were repeated twice to isolate IRB pure cultures. A total of 27 IRB isolates were successfully isolated from enrichment under the same selective pressures. IRB isolates from this enrichment strategy can be classified under two major distinct groups which are Gram-negative *Gammaproteobacteria* and Gram-positive *Bacilli*. The *Gammaproteobacteria* isolates belong to *Klebsiella*, *Pseudomonas*, *Shewanella*, *Escherichia*, *Enterobacter* genera, while the Gram-positive *Bacilli* belong to *Bacillus* and *Exiguobacterium* genera. Our findings suggest that iron-reducing *Klebsiella* thrive in coastal marine and brackish environments but not at the ocean floor and IRB belongs to the *Bacillus* genus are the dominant IRB group at the South China Sea benthic ecosystem. Among all the isolates, two isolates, KP20 and ESPK21 which were identified as *Klebsiella pneumonia* and *Bacillus licheniformis* respectively, showed higher reduction activities on both soluble and insoluble iron compared to widely studied IRB strain, *Shewanella oneidensis* MR-1. We also successfully isolated one *E. coli* strain that is capable of reducing both soluble and insoluble irons comparable to *S. oneidensis*. To the best of our knowledge, there is no indigenous *E. coli* strain capable of reducing iron reported so far. IRB isolated from this study are currently tested for their capability to generate electricity in Microbial Fuel Cell and also bioleaching of iron-containing mineral ores.

Keywords: Iron reducing bacteria, Geochemicals cycles, Marine environments

**Microbiology and Biochemistry in Food Processing,
Sustainability, Quality, Health and Safety: A Perspective**

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Food is the basic necessity of man rather the whole living world. So, to have adequate, tasty, safe and healthy food to the consumer is the single most strategy of any nation. Food being a living commodity is perishable that needs to be made available to the consumers the year round. Several factors but basically the microorganisms and biochemical reactions contribute to the highest extent to the food spoilage. The need to prevent the spoilage led to the development of various methods of food preservation. Such methods have ensured that food is free from spoilage, any toxic material and making it available to the man thus, contributing to the food sustainability and food security.

The development of techniques of food preservation and processing have their origin embedded in the ancient time when the food kept accidentally, might have got dried and preserved, a technique called drying. Similarly, the juice or milk might have got transformed by chance, into wine or curd, and became tasty and preserved, leading to the development of fermentation as a method of preservation and product development. Interestingly, it all happened when the understanding of microbiology and biochemistry was nowhere in the sight. Later developments reflected these two fields of science marvelled in the eyes of development and growth of food preservation and processing. Further, developments in science led to the growth of microbiology and biochemistry that ultimately led to the use of knowledge for better preserved food, more safe with better storage and the microbes emerging as indicator of adequate processing, quality of raw material and processed food, drinking water and development of fermented foods with predictable quality, nutrition and safety. Now, the very basics of food processing is microbiology. Not only this, with the growth of microbiology, the significance of microbiology grew by leap and bounds. Consequently, focus now-a-days is being made on the development of probiotic foods and the natural additives produced by the microorganisms. Besides, the fermented foods are being increasingly associated with the therapeutic values. Needless to say, these foods involve the activities of microorganisms. The researches in the field of microbiome are leading to better understanding of microbes and their role in human gut and health. While we have successfully eliminated the major problems of food poisoning, food infection and food spoilage, the problem of less focussed microbes like *E.*



coli, *Compylobactor*, *Listeria* are being encountered in food related illness. On the same way, the food processed by new technology or fast foods need to be evaluated for the microbiological quality and safety.

The food when processed or stored undergoes various changes, may be browning or enzymatic browning or degradation of amino acids or proteins are basically biochemical reactions. The study of them to know what are the changes or the causes, the preventive measure have led to the improvement of quality of food as well their nutritive values. Such findings have led to the improvement of processing methods besides optimum storage period of such products in the defined conditions. Biochemically, the fermentative processes and the products have also undergone improvement by optimising the fermentation process or the fermentation conditions. Application of biochemistry in conjunction with microbiology have focussed on the optimisation of enzymes production and purification, and their use in the food processing. As a result, many analytical techniques have been developed to find out the components of food, rapid techniques of analysis especially the development of biosensors. These tools have helped in evaluating the safety of the foods for human consumption. The future would see the development of more of such techniques.

The present consumer is getting increasing health conscious so the health foods are in great demand. What are the health products, what are their constituents or the active compounds or how these are prepared are some of the important questions which the consumer want to know? From the research point of view what are the active compounds, their role and metabolism in the human body are important to determine. Many of these approaches are being attempted. How the active compounds are delivered needs to have attention. Both microbiology, biochemistry and nutritional aspects have to be looked into before the product goes to the market. It has become a fashion these days, telling a food as health food. It is being advocated without testing in the animal models or in human volunteers. In such studies, besides the microbiologists, the biochemists and the nutritionists, the medical professionals also need to be associated. Our ancient culture has been advocating consumption of a particular food for a particular disease or condition but modern science is not accepting the same. At present, the focus is being made on immune-modulating effect of foods in the consumers. Apparently, after thorough study of such foods, based on sound scientific principles, such foods can be produced and recommended for consumption for a particular disease or condition. It is expected that more in depth studies on production and evaluation of food for human consumption would continue be made.

**Strategies to Improve Stem Cell Functions: Role of
microRNA**

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MicroRNAs (miRNA/miR) dysregulation has been implicated in cardiac remodeling after injury or stress, however its effects on Human CD34⁺ cells (hCD34⁺) biology and function, particularly in the context of cell-based therapy for cardiomyopathy is not fully understood. miRNA array data analysis indicates that miR-377 is a potential interest. pre-miR-377 transfection in EPCs inhibits their migration and vascular tube formation ability in HUVECs. Furthermore, hCD34⁺ cells treated with miR-377 mimic showed decrease in expression of STK35 (a novel serine/threonine kinase). Moreover, STK35 is predicted as a potential target gene of miR-377 by computational analysis. Interestingly, in a relevant mouse model of ischemia reperfusion, intramyocardial transplantation of miR-377-silenced hCD34⁺ cells promotes neovascularization leading to improvement in myocardial function and repair. Echocardiography showed LV function was significantly improved in mice receiving miR-377-silenced hCD34⁺ cells compared to control-miR-transfected hCD34⁺ cells. Taken together, these data suggest that inhibiting miR-377 in hCD34⁺ cells promotes their angiogenic ability after transplantation into ischemic myocardial tissue, potentially through activation of STK35 signaling.

TUALANG HONEY ACTION ON EXPERIMENTALLY INDUCED EXCITOTOXICITY

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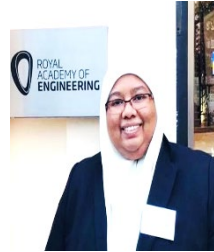


Neurodegeneration involves the progressive loss of structure and function of neurons. Among the various mechanism proposed in neurodegeneration, excitotoxicity is considered to be a major mechanism of neuronal death in acute and chronic neurodegenerative diseases. In the animal models of neurodegeneration, excitotoxicity is commonly induced with a chemical convulsant such as kainic acid (KA). In recent decades, there is an emerging trend to search for natural resources to combat against excitotoxicity-associated neurodegenerative diseases.

Among them honey, a beehive product, natural sweetener, shown to have neuroprotective effects which is attributed to its flavonoids and phenolic acids contents as well as other bioactive compounds. Recent times Tualang honey of Malaysia has gained much attention due to its rich antioxidants, antimicrobial, anti-inflammatory and other biological properties. Therefore, we have carried out a study to understand the neuroprotective action of Tualang honey in male Sprague-Dawley rats supplemented with Tualang honey prior to excitotoxic injury with kainic acid (KA). The results showed pre-treatment with Tualang honey significantly attenuated oxidative stress and neuroinflammation and thus provide neuroprotection against excitotoxicity. Therefore, Tualang honey could be considered as a potential candidate in mitigating the oxidative stress and inflammation in neurodegenerative diseases. Clinical studies on these neuroprotective agents are needed to confirm their protective effect.

Assessment of antibacterial capability of *Entada spiralis* extract on selected bacteria

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During ancient times, plants were used by our ancestors to survive and to obtain remedies to treat their diseases. The World Health Organization (WHO) reported that 80% of the people worldwide are wholly or partially dependent on plant-based drugs or herbal medicine. *Entada spiralis* Ridl is studied in this research due to a lack of investigation done on it despite used by the older generation as soaps and shampoo. In Malaysia, *Entada spiralis* Ridl. from Leguminosae family grows wild and the scientific study of it has not been explored deeply. *Entada spiralis* Ridl. is a woody climbing plant that is locally known as "akar beluru" or "Sintok". This study is performed to evaluate the antibacterial activity of Sintok extract from the stem bark of *Entada spiralis* against skin bacteria infections by the disc diffusion method. Two types of skin bacteria known as *Staphylococcus aureus* and *Streptococcus pyogenes* were selected and tested against Sintok extract. Results indicated that a concentration of 1600mg/ml gave the highest inhibition zone diameter against *Streptococcus pyogenes* rather than *Staphylococcus aureus* with a diameter of 25.5 mm and 18. mm, respectively. This study indicated that Sintok extract is a potent antimicrobial agent against bacteria causing skin infections. Future studies will further explore the potential use of Sintok extract in various personnel hygiene as well as other skins ailments.

Keywords: *Entada spiralis*, skin disease, antimicrobial



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Aqua foods for human welfare

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Department of Microbiology & Fermentation Technology,
CFTRI, Mysore, India

**Title: Is Waste Management a Sustainable Alternate
Livelihood**



Dr. C.V. Suresh

Department of Biotechnology, AIMST, Malaysia

**Identification and characterization of non-protein
coding RNAs in pathogenic bacteria**

Dr. Santhosh Valeja

Scientific Manager, Biocon Ltd., Bangalore

**Title: Hydrogen/Deuterium Exchange, Supercharging
and Top-down Analysis of Complex Mixtures, MAbs,
ADCs – Method Developments and Applications.**





Oral Presentations



OP 1

Biosynthesis of silver nanoparticles using *Aspergillus austroafricanus* CGJ-B3 and study of its cytotoxic activity

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Endophytic fungi are one of the untapped natural resources for the synthesis of medicinally active nanoparticles. The aim of the present study was to synthesize silver nanoparticles (AgNPs) using endophytic fungus *Aspergillus austroafricanus* CGJ-B3 and study its cytotoxic activity. The AgNPs were characterized by UV-Visible spectrophotometer (UV-Vis), Transmission electron microscope (TEM), selected area electron diffraction (SAED) and Fourier transform infrared spectroscopy (FTIR). Cytotoxic activity of AgNPs against MCF-7, A431, HepG2, and HEK-293 cells was assessed using 2,3-Bis-(2-Methoxy-4-Nitro-5-Sulfophenyl)-2H-Tetrazolium-5-Carboxanilide (XTT) method. AgNPs showed significant cytotoxic activity against MCF-7, A431, and HepG2 cells. Further study at the molecular level in vivo will aid in the development of novel anticancer agent.

Keywords:

Biogenic silver nanoparticle; *Aspergillus austroafricanus* CGJ-B3; Endophytic fungus.



Elemolic acid modulates inflammatory pathway by inhibiting secretory phospholipase A2 group IIA (sPLA2GIIA)

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Secretory phospholipase A2 group IIA (sPLA2GIIA) catalyze the hydrolysis of membrane phospholipids to release arachidonic acid, the precursor to a large family of pro-inflammatory mediators that have been proven to exacerbate numerous diseases. The natural molecule/inhibitors of sPLA2GIIA offer the potential to block production of a more complete set of inflammatory substances through blockade at the onset of the cascade of inflammatory reactions. The elemolic acid significantly inhibited the catalytic activity of sPLA2GIIA from human synovial fluid and *Viperarusselli* snake venom in a concentration-dependent manner (IC₅₀ value range is from 3.04 to 5.28μM), which is independent of substrate and calcium concentration. Also, in docking the E values of elemolic acid against sPLA2GIIA of human synovial fluid(PDB: 1POE) was found to be better than the E values of known sPLA2GIIA inhibitors (genistein, ursolic acid and oleanolic acid). In addition, elemolic acid also inhibited the sPLA2IIA-induced edema and its synergistic effect (hemorrhage) in mice. Thus, elemolic acid modulates inflammatory responses by targeting sPLA2IIA enzyme and prevents both AA pathway and lysophospholipids pathway which is of great therapeutic importance.

Keywords

Boswellia serrata; Elemolic acid; NSAIDs; *Vipera russelli* venom; Human synovial fluid.



OP 3

Isolation and partial purification of active principle against bacterial blight from the peel of Pomegranate (*Punica granatum* L.).

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The aim of the present study was to extract the active principle that inhibits the growth of the blight bacteria *in vitro* from the peel of the pomegranate fruit. *Punica granatum* L. the “Fruit of Paradise” is the vital cash crop in India and has met with disparate anguish of pest and diseases. Among diseases bacterial blight caused by *Xanthomonas axonopodis* pv. *punicae* is a major intimidation. The disease was first reported in India which can cause 50 to 100% production loss depending on disease sternness. The study was carried in three stages. Initial studies were carried out with three different solvents - alcohol, water and hexane at different concentrations. The crude alcohol extract expressed good results *in vitro*, but the extract was less stable. To surmount this in the next stage three buffers of pH 4, 7 and 9 were used for the extraction of active principles. All the three buffer extracts were proficient in inhibiting the growth of the organism *in vitro* and the active principles were stable for even more than five days. However the problem was further purification of compounds in pure form by column chromatography. For which reason in stage three different solvents apart from the above said in the first stage were assayed and methanol proved to be most efficient. Mobile phase was standardised by trying with five different combinations and at different concentrations. Methanol and water at a concentration of 80:20 was superlative for the elution of the active principle. Silica gel of mesh size 40 -120 was used as the column packing material. All the protocol required for the packing of the column was followed. Around 30 eluents of 2ml each were collected and analyzed for antibacterial activity. The eluent 11 and 12 showed optimistic results indicating the presence of active principle against *X. axinopodis*. The preliminary phyto constituents analysis for the crude extract revealed the presence of carbohydrates, proteins, steroids, flavonoids, glycosides, tannins, phenols and saponins. And for the eluent 11 and 12 the results showed positive only for phenols. Further the expected active principle has to be isolated in the pure form for prospect studies.

Key words: Methanol extract, Phenols, peel extract, chromatography



Database designing and analysis of data for gramineae in A.P

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In present days molecular data are available for many plant species which can be analyzed in relation to taxonomic or evolutionary or affinity context for different plant species. Biological Databases are libraries of life sciences information, collected from scientific experiments, published literature, high throughput experiment technology, and computational analyses. A biological database plays a central role in bioinformatics. They offer scientists the opportunity to access a wide variety of biologically data centrally. They contain information from research areas including genomics, proteomics, metabolomics, microarray gene expression, and phylogenetics. Information contained in biological databases includes gene function, structure, localization (both cellular and chromosomal), clinical effects of mutations as well as similarities of biological sequences and structures. There are more than 300 species of Gramineae family in Andhra Pradesh. No database of Gramineae family of Andhra Pradesh state is available. Database which contains Botanical information as well as omics information at one platform is also not available. By Designing one database which contains all Botanical & omics information at one place, will be very useful to scientific community which includes Botanist, Biotechnologist and many researchers who need information regarding Gramineae family members present in Andhra Pradesh State with Bioinformatics analysis. This chapter presents information of Gramineae family with list of many literature review materials. It also gives information of various online resources of Gramineae family. It also represents various Bioinformatics terms like Phylogenetic analysis information of RbcL and matK gene, Homology Modelling, Next Generation Sequencing, Transcriptome, RNA-Seq, Sequence assembly.

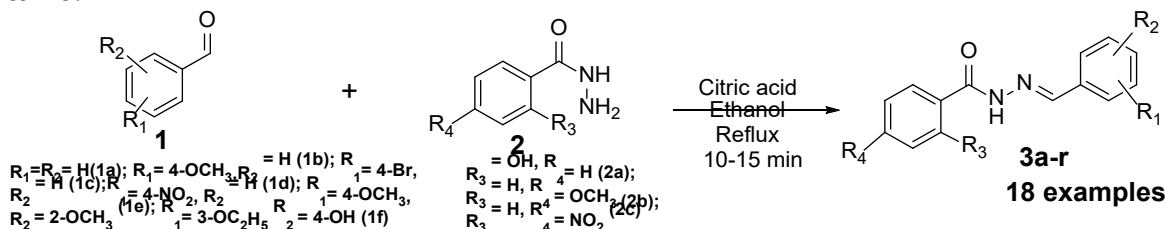
Synthesis and biological evaluation of aldo-*N*-acylhydrazones

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N-Acylhydrazones (NAHs) are considered as “medicinally privileged scaffold” because of their wide range of biological activities such as anti-inflammatory, analgesic, anti-tubercular, antiviral agents etc.¹ In addition to their biological significance, *N*-acylhydrazones are an important building blocks in synthetic organic chemistry. For instance, *N*-acylhydrazones are an intermediates in aza-Diels-Alder cyclisation,² thiazolidinone and thiazolidine synthesis.³ Iproniazide and isocarboxazide are the two important drugs which are prepared by the reduction of the corresponding *N*-acylhydrazones.⁴ Because of their potential utility in various fields, enormous research has been conducted and many efficient methods have been reported for the synthesis of *N*-acylhydrazones.⁵ Despite these developments, there are still some drawbacks such as harsh reaction conditions, lengthy reaction times, use of toxic catalysts etc. Therefore, the development of practical, green and sustainable synthetic routes for the synthesis of *N*-acylhydrazones remains an active area of research. However, to date there are no reports on citric acid catalyzed synthesis of *N*-acylhydrazones. Herein, we demonstrated a rapid, more efficient, green and sustainable synthetic route for the synthesis of *N*-acylhydrazones (**3**) from readily available aromatic aldehydes (**1**) and hydrazides (**2**) catalyzed by biodegradable citric acid in ethanol under reflux conditions (Scheme 1). Wide substrate scope, easy to perform, cleaner reaction profile, short reaction times and good yields at low catalyst loading and products free from chromatographic purification are the notable advantages of the present method. Antibacterial activities of the synthesized compounds are systematically evaluated. From this study, it is observed that the synthesized compounds exhibited moderate to good antibacterial activity against Gram-positive and Gram-negative bacterial strains.



Scheme 1. Citric acid catalyzed synthesis of *N*-acylhydrazones.

**Revamping Immunity and Balanced Diet Prevents Viral Infections with
Special Emphasis on Covid-19**

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Background and aims: A balanced nutritional diet is essential in maintaining immunity and for deterrence as well as desisting of viral infections. Nevertheless, currently very less information is available online regarding nutrition consumption during the period of coronavirus infection i.e (COVID-19). In our systematic review article, we portrayed and aimed to evaluate evidence from various previous clinical trials which was based on nutritional interventions for viral diseases and given a concise overview.

Methods: A systematic search was carried out employing 3 key medical databases: PubMed®, Web of Science® and SciVerse Scopus®. Studies were performed and evaluated suitable if clinical trials in humans, appropriate immunological parameters on viral and respiratory infections need to perform. Basic Clinical trials on nutritional vitamins, minerals, nutraceuticals as well as probiotics were included.

Results: We have explored 10 review articles and extracted data for our study. A total >2000 participants were included and excluded several other trace elements as well as various vitamins but in inclusion criteria mainly concentrated on those which have shown propitious immune-modulatory effects against viral respiratory infections.

Conclusions: We have encapsulated the potential health benefits of some minerals, vitamins as well as certain designer foods, neutraceuticals and probiotics in viral infections. Based on this nutritional interventional strategy available from our present data, it could be promising to abstain and reduce the COVID-19 infection replication and boost our immunity to fight against the virus.

Keywords: COVID-19, Immunity, Vitamins, Nutritional Intervention Strategy.



OP 7

Molecular Dynamics and Docking studies to explore the Crystallographic structure of human Rho-C with Epigallocatechin gallate (EGCG)

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The aim of the present research was to study the anticancer effects of EGCG of green tea on human Rho-C. A solved protein structure for human Rho-C is available at the protein data bank (PDB). Therefore, we had taken it from RCSB PDB. Keeping the aim to determine molecular level interactions (molecular simulations and protein docking) of human Rho-C with EGCG of Green tea. We extended our work *in vitro* to *in silico* studies. To gain better relaxation and accurate arrangement of atoms, refinement was done on the human Rho-C by energy minimization (EM) and molecular dynamics (MD) simulations using 43A2 force field of Gromacs96 implemented in the Gromacs 4.0.5 package, finally the interaction energies were calculated by protein-ligand docking using the Autodock. The human Rho-C showed that known key residues playing important role in active site for ligand binding. The information thus discussed provides insight to the molecular understanding of human Rho-C together with enzymatic docking studies, to reveal key differences that could be useful for development of new anti-cancer drugs. These *in vitro* and *in silico* structural studies prove the effective inhibition of Rho-C of homo sapiens activity by EGCG of green tea in neoplastic cells and thereby provide new insights for the development of novel anti-cancer drugs.

Keywords: Rho-C, Homo sapiens, EGCG, Green tea, Molecular Dynamics, Docking, Anticancer



Bioenergy from Algae: Fuel to our Future

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Regular depletion of non-renewable fossil fuels urges the scientific community to augment the production of renewable fuels. Though number of advanced techniques emerged to generate more renewable fuels, still it needs lot of efforts towards implementation. Biofuels are one of the good examples of renewable energy sources which are non-polluting and eco-friendly. In addition, people are preferred to generate energy from any waste including biological waste. In this process, our laboratory chose photosynthetic green algal species as source to produce biofuels such as biohydrogen and bioethanol by altering physico-chemical and biological methods. In extent, we used certain nanoparticles and achieved the improvement of biohydrogen and bioethanol production. Present work may be useful to enhance the production of biofuels from algae for commercial purpose.

OP 9

Influence of culture conditions on CMCase production by *Aspergillus protuberus* in Submerged fermentation

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The purpose of this study was to determine the influence of culture media on Carboxymethyl cellulase (CMCase) production and protein content by *Aspergillus protuberus* in submerged fermentation. In order to select the best suitable medium, the production of CMCase was estimated by growing the *A. protuberus* in four different culture media for 7 days at 30°C temperature at 150 rpm. Among four culture media, Czapek dox broth, Potato dextrose, Mandel and Reese broth and Malt extract broth media were screened for the production of CMCase by *A. protuberus*. Among the different broth medium, Czapek dox broth and Malt extract broth was found to be the best for maximum production of CMCase (3.7 FPU/ml) and protein content (12.75 mg/ml) at 2nd and 8th day of incubation, respectively. For further study, Czapek dox broth medium was selected for CMCase production.

Keywords : *Aspergillus protuberus*, Carboxymethyl cellulase, Protein content, Submerged fermentation.



OP 10

Biodiversity - Butterflies benefit from Agricultural buffers in the field areas of Southern Andhra Pradesh – India

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Butterflies flutter from flower to flower, providing researchers with a glimpse of an ecosystems health. Butterflies help gauge environmental conditions, serve as a food source for birds and wild life and like honeybees, pollinate plants. This last function is vital, as one-third of the food produced for human consumption is dependent on native pollinators. Upland habit buffers are strips of native grasses and wild flowers planted along agricultural field margins. These strips are widely planted, often to protect waterways from erosion or agrichemicals. Farmers need to receive financial assistance to create buffers through a number of conservation programmes by the government. Our findings in the field areas of southern Andhra Pradesh suggest that buffers benefit bird and butterfly communities. In our findings in the agricultural lands of southern Andhra Pradesh during the period from July to November of 2018 & 19 we found 42 different species of butterflies in the conservation buffers surrounding the agricultural fields. Butterflies are attracted to the plants more than to agricultural crops. Still we are investigating the importance of butterflies to the Ecosystem and the linkages between butterflies and other wildlife and plant species. Conservation buffers provide a solution for increasing native pollinators and improving habit while providing financial benefits to the farmers.

Key words: Butterflies, Buffers, Ecosystem, Pollinators, conservation

OP 11

Landraces as a Source for Superior Alleles: A Step Towards Mapping Population Development, Linkage Map Construction and QTL Identification for Yield Related Traits under Drought Stress in Foxtail Millet (*Setaria italica* L.)

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Foxtail millet is a small grained C4 Paicoid cereal that belongs to the family Poaceae, known for tolerance to various abiotic, biotic stresses and seed with high nutritional value and a genome size of about ~515 MB. Since, the beginning of Green Revolution, it started to diminish from their cultivation areas irrespective of their superior nutritional value and productivity under variety of stresses compared to other major cereals. Keeping in view of the importance of these landraces, we have generated 20 numbers of genetically fixed lines of local landraces of foxtail millet and evaluated by precise phenotyping (drought stress and seed micronutrient content) along with released cultivars. Further phenotypic studies confirm a wide range of seed micronutrients in landraces and out performed under induced drought stress conditions in vegetative and reproductive stress compared to release cultivars. Based on the integrative data, different combinations of biparental crosses were made, true F₁'s were selected and advanced to F₄ generation. Further, the molecular genetic diversity was assessed using high throughput illumina HiSeq2500 Next Generation Sequencing (NGS) technology based Whole Genome Re-sequencing of the selected parental lines was initiated. Our study is one of the pioneers where a



combination of Phenotyping and advanced Genotyping technologies will be utilized for the identification of lines with superior allelic combinations to combat malnutrition with high yielding varieties under various stresses. The potential utility of these genetic (landraces), genomic (NGS whole genome based SNP's) in parental lines and segregating mapping population of foxtail millet will be presented.

OP 12

NADP-malic enzyme and pyruvate, phosphate dikinase activity in onion (*Allium cepa* L.) seedlings under drought stress

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Drought is one of the major stress which affects agricultural crop productivity around the world. Against drought plants have developed variety of defense mechanisms involving physiological, chemical and molecular responses. The aim of the present work is to investigate the response of NADP-malic enzyme (NADP-ME, EC 1.1.1.40) and pyruvate, phosphate dikinase (PPDK, EC 2.7.9.1) to drought stress in onion seedlings. The experimental design was randomized entirely, with different concentrations of polyethylene glycol – 6000 i.e., 0, 25 g/l, 50 g/l, 75 g/l and 100 g/l treatments in six different cultivars of *Allium cepa* L. namely Agrifound rose (AF), Bellary (BL), Prema-178 (PR), Nasik red (NR), Arkakirthiman (AK) and Arkalalima (AL) and the NADP-ME and PPDK was studied at different time intervals of 0 h, 4 h, 8 h, 24 h and 48 h. Result interprets that the activities of NADP-ME and PPDK increased with increasing concentration of PEG-6000. 3.9 and 3.2-fold increase in NADP-ME and PPDK activity was observed in AL onion after 48 h of drought treatment when compared to control. The cultivar AL exhibited best response followed by AK and BL. Therefore NADP-ME and PPDK, the C₄ enzymes participate in the drought stress response of onion, a C₃ Plant. Further research may help in the understanding of the drought stress mechanism of adaptation of the onion germplasm to drought.

Key words: NADP-ME, PPDK, Drought stress, Onion cultivars, PEG-6000

GC-MS ANALYSIS AND ANTIBACTERIAL ACTIVITIES OF *Moringa oleifera* LEAF EXTRACTS ON SELECTED CLINICAL BACTERIAL ISOLATES

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Man has a long history of utilizing herbal preparations for treatment of infections which most often are used as first aid before the application of modern medicine. Therefore, this study was aimed at investigating the quantitative phytochemical components, GC-MS analysis as well as the antibacterial properties of the aqueous and ethanol leaf extracts of *Moringa oleifera* on some clinical bacterial isolates. Aqueous and ethanol extractions from *M. oleifera* yielded 40.75% and 62.87% respectively. Flavonoid (20.76mg/100g) was the highest while saponin (2.00mg/100g) was the least of all phytochemicals detected. The proximate nutrient composition revealed that carbohydrate (46.59%) was the highest while lipid (7.37%) was the least. Eleven compounds were detected in the both extracts by Gas Chromatography- Mass Spectrometry. The eleven compounds identified had higher concentrations in the ethanol extract except 2-octenoic (26.09mg/kg) acid and 1, 2-epoxyhexadecane (8.84mg/kg) in aqueous extract which were far higher than 0.62mg/kg and <0.01mg/kg in ethanol extract. The antibacterial activity of ethanol extract was more active against the bacterial isolates than the aqueous which increased as the extract concentration increases. However, the control gave no zone of inhibition. The minimum inhibitory concentration and minimum bactericidal concentration were 6.25mg/ml. Alcohol extract gave a better result compared to aqueous extract. The reports revealed that *Moringa oleifera* is an all-important herb which can be used to inhibit infections arising from the studied pathogenic bacteria isolates.

Keywords: *Moringa oleifera*, pharmaceutical use, chromatography, 5- Nonanol-dibutylcarbinol, antibacterial properties, public health, medicinal plant

OP 14

Molecular Identification of *Salmonella* Serotypes Isolated from Selected Poultry Farms in Zaria Metropolis, Kaduna State, Nigeria

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Salmonellosis in poultry are distributed world-wide and result in severe economic losses when no effort is made to control them. This study was carried out to molecularly identify *Salmonella* serotypes from poultry feed, water, droppings and poultry handlers from selected poultry farms in Zaria. A total of 640 samples consisting of 160 faecal droppings, 160 feed samples, 160 water samples and 160 hand swab samples were collected for the research. The samples were inoculated into peptone water for pre-enrichment and incubated at 37°C for 24 hours. Selective enrichment was carried out by inoculating 1 ml of the enriched sample into 9 ml of Rappaport Vassiliadis broth. The inoculated Rappaport Vassiliadis broth was incubated at 37°C for 24 hours. This was followed by inoculation of a loop full onto *Salmonella Shigella* Agar plate and incubated at 42°C for 24 hours. Colonies with the characteristic colonial morphology of *Salmonella* were Gram stained and further characterized biochemically. The isolates were serotyped using polyvalent *Salmonella* antisera (Oxoid, UK) according to Kauffmann White Scheme by slide agglutination test. The serotyped *Salmonella* isolates were characterized molecularly by PCR. Susceptibility of the isolates to selected antibiotics was determined using Kirby-Bauer disk diffusion method. Four (0.63%) *Salmonella* serotypes were isolated, namely *Salmonella Gallinarum* (2), *Salmonella Pullorum* (1) and *Salmonella typhimurium* (1). In conclusion the isolates were found to be *Salmonella gallinarum*, *Salmonella Pullorum* and *Salmonella typhimurium*.

Keywords: *Salmonella*, serotypes, poultry, susceptibility, samples



OP 15

Green Synthesis, characterisation and cytotoxicity investigation of nanoparticles of aqueous extract of *Senna occidentalis* leaf

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Since the presentation of Nobel laureate Richard P. Feynman famous 1959 lecture “There’s Plenty of Room at the Bottom”, the field of nanoparticle research have grown tremendously and in recent times the production of nanoparticle from plant extract have open a new era in phytomedicine research. The aim of this study is to synthesis, characterize and evaluate potential toxicity of nanoparticle of *Senna occidentalis* leaf extract. The nanoparticle of the aqueous extract of *Senna occidentalis* leaf were synthesised using standard method and were characterised using standard methods (UV spectrophotometry, Fourier Transmission Infra-Red, Scanning Electron Microscopy and Transmission Electron Microscopy and elemental composition using XRD. Cytotoxicity were evaluated with brine shrimp lethality assay (BSLA). The study revealed that the nanoparticles of aqueous extract of *Senna occidentalis* leaf on FTIR spectral with peaks at 3264;42.940, 2110;95.555, 1640;65.489 and 61;36.336 and highest absorbance at 900 nm though out the reaction for UV-Vis spectrophotometry spectral. Morphological characterisation showed that these nanoparticles are spherical in shape and well distributed with statistic average size ranges from 10- 20 \pm 3.52 nm. Their elemental composition reveal presence of oxygen, silicon, silver, Gold Calcium, Sodium, Magnesium, Nitrogen, carbon and Aluminium and the brine shrimp lethality assay showed these particles to be moderately toxic. These results showed that the nanoparticles of aqueous extract of *Senna occidentalis* leaf may be toxic and also useful for induction of apoptosis of cancerous cells.
Keywords: Cytotoxicity, SEM, TEM, BSLA , *Senna occidentalis*, Nanoparticles
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OP 16

Phytochemical analysis and *In vitro* biological assessment of *Gyrocarpus americanus* and *Murinda pubescence*: potential effectiveness in treating Alzheimer's disease and Diabetes Mellitus simultaneously

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As Alzheimer's disease (AD) and Diabetes Mellitus (DM) are most likely to appear together in aged people. Many studies have been recorded over the past few years on the search for agents to treat AD and DM simultaneously. In this study, extracts of *Gyrocarpus americanus* and *Murinda pubescence* were assessed for their capacities to inhibit target enzymes Acetylcholinesterase (AChE), Butyrylcholinesterase (BuChE) and α - & β -glucosidases. The methanolic extracts and derived chloroform fractions were found to be most prominent in inhibition with IC₅₀ values range of 63.14±20.8 – 10.29±0.8 µg/mL. The most active chloroform fractions exerted remarkable DPPH and ABTS radical scavenging activity. In MTT cell viability assay, these fractions were nontoxic and neuroprotective against induced SK N SH cell injury. The phytochemical analysis revealed that these activities could be attributed, at least in part, to the presence of large quantities of phenolics and flavonoids in active chloroform fractions. In conclusion, the aforementioned results provided valuable evidence for the potential of chloroform fractions of methanolic extract of *G. americanus* and *M. pubescence* as prospective material for further development of multifunctional agents to control both DM and AD simultaneously.

Key words: *Gyrocarpus americanus*, *Murinda pubescence*, phytochemical analysis, antioxidant activity, anticholinesterase activity, antidiabetic activity



OP 17

Induction of plant growth promotion and drought stress tolerance by non-host endophytic bacteria in rice (*Oryza sativa* L.) and peanuts (*Arachis hypogaea* L.)

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Plant growth promoting endophytic bacteria, being a vital agent have been described for abiotic stress mitigation and growth promotion in plants for sustainable agriculture practices. The present study aims the isolation and *in vitro* characterization of plant growth promoting properties of endophytic bacteria from the roots of *Prosopis juliflora* (Sw) dc and the effect of these endophytes in non-host plants *i.e* rice (*Oryza sativa* L.) and peanut (*Arachis hypogaea* L.) under droughty stress conditions. Several endophytic bacterial strains were isolated the root interior of *P.juliflora*, among the isolated strains, *Bacillus amiloliquefaciens* M69 (PJ4), *Stenotrophomonas maltophilia* SaY2-b (PJ6), *Pseudomonas* sp. SG-08s (PJ12) were showed the best performance in extra cellular enzyme activities (cellulase, pectinase, amylase and lipase) and plant growth promoting activities (nitrogen fixation , ammonia, IAA, ACC deaminase, siderophore production and phosphate solubilization), along with salt and heavy metal tolerance. PCA-Biplot ordination data confirmed that PJ4, PJ6 and PJ12 strains have displayed distinguishing similar characteristics. The activity of cellulase and pectinase observed in these isolates indicates the importance of these characteristics for survival and colonization into the plant. Further these bacterial strains were tagged with *gusA* (PJ4::*gusA*11, PJ6::*gusA*11 and PJ12::*gusA*11) genes were used to enumerate and visualize tissue colonization and observed chronologically first on root surfaces, then in root internal tissues, and in the internal tissues of leafs. The effect of inoculation of three bacterial endophytes was observed on growth and water status in rice and peanut plants under drought stress conditions. Plants were exposed to drought stress by withholding ten days irrigation at vegetative growth stage (45-55 days in rice and 55-65 days in peanut). The bacterial inoculations minimized the drought stress-imposed effects, significantly increasing shoot biomass, root biomass, chlorophyll content, proline and total soluble sugars. Our data suggest that rice and peanut plants can be colonized with three isolates isolated from *Prosopis juliflora* plants. The endophytes enhance the growth of rice and peanut plants and can be protected under drought stress.

OP 18

Chemical composition, antioxidant and antibacterial activities of the essential oil of *Myrtus communis* L. leaves.

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Myrtus communis L. (family - Myrtaceae) is an evergreen aromatic medicinal plant which has been used since ancient times for medicinal, food and spice purposes. The main purpose of this study was to determine the chemical composition, in vitro antioxidant and antibacterial activities of the essential oil of *Myrtus communis* L. leaves. The chemical composition of the essential oil was analysed by gas chromatography coupled with mass spectrometer (GC-MS). The major components of the essential oil were eucalyptol (33.55 %), linalool (29.2 %), Linalyl anthranilate (9.048 %), and α -terpineol (7.16 %). The physicochemical properties of the essential oil were also determined. The average oil yield was 0.55 ± 0.001 % (w/w) with pale yellow color and pleasant odour. It was slightly soluble in water and ethanol whereas it was soluble in chloroform, petroleum ether, and ethyl acetate. Its density, specific gravity, refractive index, optical rotation, specific rotation, acid value, saponification value and ester value were 0.94 ± 0.001 g/mL, 0.89 ± 0.001 , 1.53 ± 0.001 , $-14.87 \pm 0.153^\circ$, $-555.152 \pm 3.57^\circ$, 4.55 ± 0.710 , 37.45 ± 2.8 , and 33.014 ± 2.85 respectively. The antioxidant activity of the essential oil was studied by 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging method and its activity was compared with ascorbic acid as a standard antioxidant. The essential oil and standard antioxidant showed their maximum activity 88.33 % and 98.33 % inhibition at concentration of 200 μ g/mL with IC₅₀ value of 15.89 and 5.94 μ g/mL respectively. Moreover, the antibacterial activity of the essential oil was also evaluated using disc diffusion method against *S. aureus*, *E.coli* and *S.typhi*. It showed high activity against *E.coli*. In conclusion, the essential oil of *Myrtus communis* leaves is a potential source of natural antioxidants and antibacterial compounds which are used for the treatment of various diseases caused by free radicals and microbes. Thus, it is a promising candidate for antioxidant and antibacterial agents.

Keywords: *Myrtus communis*, essential oil, Hydro distillation, GC-MS, eucalyptol, linalool, linalyl anthranilate, α -terpineol, antioxidant activity, antibacterial activity, DPPH, IC₅₀, disc diffusion.

OP 19

Reproductive biology of the Blubberlip snapper, *Lutjanus rivulatus* (Cuvier 1828) from south-east coast of India

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The commercially important trawling and subtropical reef fish stock are being steadily overfished worldwide. The members of family Lutjanidae are carnivorous coral reef fish and majority of the species of genus *Lutjanus* are confined to tropical and subtropical marine waters, where juveniles of some species are found in brackish waters during spawning season. The Blubberlip snapper/ Maori snapper *Lutjanus rivulatus*, is listed as least concerned species in the IUCN red list. In the present study a total of 122 specimens (74 females and 48 males) of *L. rivulatus* of length range 157mm – 410 mm TL were collected from both artisanal and trawl catches along south-east coast of India (Vishakapatnam, Nellore, Chennai and Mandapam) from April 2017 to February 2020. The fishes were collected monthly and their total length (TL), standard length (SL), total weight (TW), sex, gonad weight and maturity status recorded. The gonads were fixed in 10% formalin for histological analysis on maturational stage and revealed five maturity stages based on the ovarian, testicular histology and macroscopic observation analysis. Results of calculated gonadosomatic index (GSI) showed that maturation occurred from February to July with a peak in May & June. The species *L. rivulatus* is an important fishery resource in the south-east coast of India and need a management measures to avoid overexploitation/ over-fishing in the study region. Combined our results indicates the size limit and seasonal spawning support for establishing protection measures such as protected areas and legalising the minimum legal size (MLS) of fishing to enhance biological traits and prevent over exploitation.

Keywords: *Lutjanus rivulatus*, fishery, maturity, reproductive cycle, gonadosomatic index, spawning season.



OP 20

Prenatal baicalein exposure induced oxidative stress and it's recovery by testosterone administration during postnatal period in male Wistar mice

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Excessive baicalein (BC; a flavonoid) intake during pregnancy period has been demonstrated to provoke oxidative stress an associated factor of male infertility in offspring. The role of testosterone depot in the recovery of damaged antioxidative system in prenatal BC exposed male mice was tested. For this female Wistar mice were administrated intraperitoneally with 30, 60 and 90 mg/kg BW of BC on gestation days 11, 13, 15 and 17. F1 BC exposed males were sacrificed on post-natal day (PND) 60 to assess the oxidative stress. The results showed a significant increase ($P < 0.0001$) in testicular, liver and kidney malondialdehyde (MDA) levels in prenatal BC exposed males. In contrast to increased lipid peroxidation observed decrease in ($P < 0.001$) levels of antioxidant enzymes such as superoxide dismutase (SOD) and catalase (CAT) in prenatal BC exposed adult males in a dose dependent manner than controls. Administration of testosterone (4.16 mg/kg body weight) to BC exposed adult mice were normalized the levels of MDA, SOD and catalase in testis, liver and kidney and are comparable to controls. The administration of testosterone refused the antioxidant defense system and is proved in the present study.



CHARACTERIZATION OF RICE LANDRACES CULTIVATED IN SAVANNA ZONES OF NIGERIA BASED ON QUALITATIVE TRAITS

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The study aimed at characterization of seventy rice landraces cultivated in savanna zones of Nigeria based on qualitative traits. The field experiment was conducted at the Botanical Garden, Department of Botany, Ahmadu Bello University, Zaria using Randomized Complete Block Design with three replications. Standard Evaluation System (SES) of International Rice Research Institute (IRRI) was used to evaluate the following qualitative traits viz: Basal leaf sheath colour, Leaf blade colour, Leaf tip colour, Leaf margin colour, Juntura Colour, Ligule colour, Auricle colour, Internode colour, Node colour, Stigma colour, Apiculus colour, Awning, Sterile glume colour, Chalkiness of endosperm and Seed coat colour. Variation was observed among the rice landraces in all the traits studied. Among the qualitative traits, variation was observed to be high (4 different types) for basal leaf sheath colour, apiculus colour, seed colour and chalkiness of endosperm. Based on cluster analysis, the landraces were grouped into five cluster groups at 60% similarity coefficient having landraces with none to less chalky endosperm, medium to large chalky endosperm, purple lines basal leaf sheath colour, purple blotch leaf blade colour and purple to red apiculus colour respectively. The inter-cluster distances were higher than the intra cluster distance in all cases reflecting wider genetic diversity among the breeding lines. The study indicated that qualitative traits are useful for preliminary evaluation and assessing genetic diversity among morphologically distinguishable rice landraces. Diversity observed in the rice landraces based on the qualitative traits could be of used in selecting parents for breeding and genetic studies.

Key words: Rice landraces, Qualitative traits, Cluster analysis



**PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY OF
MORINGA OLEIFERA (LAM) LEAVES EXTRACT**

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This study aimed at evaluating the phytochemical constituents and antibacterial activity of the leaves of *Moringa oleifera*. Methanol extract of the leaves was used for the phytochemical screening and its antibacterial activity. *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were used in this study, using agar well diffusion method. The phytochemical screening revealed the presence of secondary metabolites such as alkaloids, flavonoids, tannins, carbohydrates, saponins and the absence of steroids and triterpenes in the methanol extract which made it to have antibacterial potentials. The extract showed remarkable activity against the growth of the selected bacteria; nevertheless, the methanol extract had more antibacterial activity against Gram positive bacteria than Gram negative bacteria, the extract show inhibition activity for all the organisms at the concentration of 100mg/ml. The extract was not active at low concentration, which is 12.5mg/ml but had diameter zone of inhibition of 14, 16 and 14 mm respectively all at the highest concentration (100mg/ml). The minimum inhibition concentration (MIC) that inhibits these bacterial growth is 50mg/ml for all the three bacteria and the minimum bactericidal concentration (MBC) that kills the growth of the bacterial isolates was 100mg/ml. The result showed that *M. oleifera* can be used to produce a valuable antibacterial drug in the treatment of infections caused by the test organisms.

Key words: Phytochemical screening, Antibacterial activity, *Moringa oleifera*



OP 23

**A SENSITIVE PHENOTYPIC TEST FOR DETECTION OF KPC
CARBAPENAMASE AMONG KLEBSIELLA PNEUMONIA ISOLATED FROM
CLINICAL SAMPLES FROM NORTH- EASTERN NIGERIA USING MODIFIED
HODGED TEST**

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Carbapenamase is an enzymes that hydrolyse a group of antibiotic called carbapenam1which was a drug of choice for the treatment of multidrug resistance bacteria especially Extended spectrum beta lactamase producers its mode of action is by binding to the penicillin –binding protein(PBAS) inhibiting the synthesis of bacterial cell wall. A total of 400 samples were obtained from different clinical samples from Abubakar Tafawa Balewa University Teaching Hospital Bauchi, the samples includes urine (142), sputum (103), High vaginal swab (82) and wound swab (73). Two hundred and five (205) isolates were confirmed as Gram negative bacteria using standard microbiological techniques. All isolates were subjected for susceptibility testing in which 149 isolates shows resistance and intermediate by disc diffusion method with (16mm-21mm) diameter according to Clinical Laboratory Standard Institute (CLSI), 2017, which were subjected for Modified Hodged. The results of hodged test indicate 38 isolates as carbapenamase producers. The frequency of occurrence of Klebsiella pneumoniae was (19), E. coli (15), followed by Pseudomonas aeruginosa (3) and Proteus mirabilis (1)

Keywords: Klebsiella pneumonia, Bauchi, carbapenamase



OP 24

Harpephyllum caffrum aqueous infusion inhibits key enzymes linked to type 2 diabetes

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The increased production of reactive oxygen species has been suggested as one of the mechanisms responsible for the progression of type 2 diabetes and its comorbid complications. In the current study, the antioxidative and antidiabetic efficacies of *Harpephyllum caffrum* stem bark hot aqueous infusion, as well as its effect on gluconeogenic and nucleotide hydrolysing enzyme activities in Fe^{2+} - induced oxidative stress in hepatic tissue, were investigated. The results indicated that the infusion effectively reduced ferric iron (FRAP) while it also significantly ($p < 0.05$) mopped up free radicals (OH^\bullet and DPPH) in a dose-dependent manner. It inhibited α -amylase and α -glucosidase enzymes activity in vitro and increased glucose uptake in yeast cell suspension. FeSO_4 induced oxidative stress in liver tissues significantly ($p < 0.05$) reduced the activities of antioxidative enzymes (CAT, SOD, GSH) while contrastingly increased lipid peroxidation (MDA) and the activities of glycogen phosphorylase, fructose-1,6-bisphosphatase and ATPase enzymes. Nevertheless, treatment with *Harpephyllum caffrum* hot infusion reversed these abnormalities. Data from this study demonstrate that *Harpephyllum caffrum* aqueous infusion inhibits key enzymes linked to type 2 diabetes, modulates gluconeogenic enzymes and also abates liver redox imbalance through elevation of endogenous antioxidant enzymes activity.

EFFECT OF CASHEW (*ANACARDIUM OCCIDENTALE*) NUT SHELL PENTANE EXTRACT AND FRACTIONS ON SPORULATED AND UNSPORULATED *EIMERIA TENELLA* OOCYSTS

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Cashew (*Anacardium occidentale*) nutshell extract has been considered a cheap by-product of cashew nuts with various antimicrobial activities. We investigate the in vitro anti-coccidial effect of cashew nutshell (CNS) pentane extract and fractions on sporulated and sporulation of unsporulated *Eimeria tenella* oocysts. The extract was prepared via maceration in pentane, fractionated using column chromatography, and inhibitory activities of the fractions against sporulated and unsporulated *Eimeria tenella* oocysts were ascertained through viability test. About 34.02% CNS pentane extract was recovered and contained high amount of tannin ($4.00 \pm 0.00\%$) and alkaloids (3.17 ± 0.03) followed by saponins (1.48 ± 0.02), phenols (1.09 ± 0.03) and flavonoids (1.03 ± 0.03). Six pooled fractions (A, B, C, D, E and F) were collected with fraction A (n-hexane fraction) having the highest inhibitory activity against sporulated *E. tenella* oocysts based on the percentage lyses (95%) and viability of the remaining unlysed oocysts (5% / not viable) after 12 hours of incubation. Standard drug Amprolium® (1.5%) had percentage lyses of 59.4% and unlysed oocysts of (40.6%) which were found to be viable after 12 hours of incubation. The active fraction A had the highest inhibitory effect (100% inhibition) against sporulation of the unsporulated *E. tenella* oocysts at 20mg/kg and 30mg/kg after seven days of incubation. Therefore, the n-hexane fraction of CNS pentane extract was found to have inhibitory activities against sporulated and sporulation of *E. tenella* oocysts.

Key words: *Eimeria tenella* oocysts, Sporulation, Cashew nut, Fractionation, Coccidiosis



**COMPUTATIONAL ANALYSIS OF PEPTIDES IN GEOBACTER
SULFURREDUCTENS ASSOCIATED WITH INDUSTRIAL POLLUTION**

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In the modern era of advanced civilization, industrial pollution is the major cause for most environmental diseases. This form of pollution is one of the major threats for global warming in all parts of the world. There are various forms of industrial pollution. Industrial pollution does have a negative impact on the quality of air and it can also enter in the soil to cause a widespread of environmental problems. The major activities in industries are based on the source of air, water and land. Pollution in natural resources leads to illness and loss of life across the globe. The World Health Organization (WHO) estimated that the pollution in the outdoor air alone contributes around 2% of diseases associated with the improper functioning of heart and lungs and it was also estimated that about 5% cancer in lungs and 1% of infections in chest were due to pollution. The microorganism, *Geobacter sulfurreducens* belong to the genus of proteobacteria. The species of *Geobacter* are characterized by the anaerobic respiration of bacterial species which are capable of making their usage in the process of bioremediation. *Geobacter sulfurreducens* are capable of creating biofilms as a thick network on the anodes of cells with a microbial fuel for processing the mechanism of extracellular electron transfer. The production of electric currents is applicable when the transfer of electrons migrates to anodes and coupled with the intracellular organic waste. The most up-regulated genes, omcs, were required for the reduction of Fe (III) and Mn(IV) oxide. The microbe, *Geobacter sulfurreducens* is rod-shaped with a gram-negative cell wall. *Geobacter* is also known as a type of bacteria to analyze the level of conductivity in enhancing flow of electricity and the species of *G. sulfurreducens* is also known as “electricigens” because of their ability to create an electric current and produce electricity. *Geobacter sulfurreducens* is an anaerobic species of bacteria and it belongs to the bacterial family of *Geobacteraceae*. The genus “*Geobacter*” was discovered by Dr. Derek R. Lovely in 1987. The microbe *G. sulfurreducens* was first isolated in Norman, Oklahoma, USA from the materials found around the surface of contaminated sewage. On the basis of bioinformatics, initially the sequence of the protein omcs was obtained in FASTA format using UNIPROT. Then, the FASTA



sequence of omcs gene was uploaded in galaxy seek lab to identify parameters associated with the mechanism of protein threading. Then, the threading based protein modeling server called I-TASSER (Iterative Threading Assembly Refinement-A bioinformatics method for predicting 3D structure model of protein molecules from amino acid sequences) was utilized to model the protein on the basis of the threading mechanism. I-TASSER detects structure templates from the crystal structures deposited in the Protein Data Bank by a machine learning based pattern matching technique called fold recognition (threading). The primary function of I-TASSER is to identify the structural templates from the PDB by the approach of multiple threading with the construction of a full-length atomic model by the iterative assemblies of template-based fragments through simulations. The functional insights of the targets are then derived by the concept of re-threading the 3D models through the functional database of the protein called BioLiP. Initially, the protein sequences were downloaded in FASTA format from Uniprot database and uploaded in the I-TASSER server. Then the physicochemical properties of primary structure i.e. The presence of the α -carbon atom in all amino acids along with the exception of the single amino acid i.e. glycine. As a result, all of the known amino acids except glycine can exist in two different spatial or geometric arrangements called as optical isomers (mirror images to the right and left direction) and these isomers also exhibit the property of optical rotation (rotation of the plane of polarized light composed of light waves that vibrate in one plane, or a direction) along with the presence of helix, sheets, turns and coils in secondary structures. The tertiary structure of proteins is the combination of two or more secondary structure and finally the quaternary structure i.e. the presence of a prosthetic group along with the tertiary structure of the protein were analyzed by the industrial technology along with the usage of a dizzying array of chemicals to keep the modern life humming. These chemicals, after fulfilling their roles in the production, end up accumulating in the atmosphere. One of the main problems is that there is a lack of public awareness with respect to the pollution. The nature of the growing industrial pollution is never limited to developed nations. Industrialization contributes to a major part for the economic development and prosperity of a country. The emergence of great factories and increase in consumption gave rise to the increase of unprecedented pollution and large volume of industrial discharges by adding load to the untreated human waste and hence there comes the realization of growing awareness of factory pollution across the globe. These aspects also highlight a growing issue i.e. the desire of developing nations to achieve first class in the world's standard of living and production.



COVID-19 and its controlling methods

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As worldwide communities are in the progress of fighting against COVID-19 pandemic, it is eventually intensifying the vulnerabilities and inadequacies of global food system to a high degree of uncertainty. Health and socio-economic impact causes by global pandemic are still largely unknown will further deteriorate the food security and nutritional status of the most vulnerable population group. Malnutrition, child stunting and low birthweight, childhood overweight and adult obesity which caused by poverty, food insecure or excess consumption are on rise in all region around the world. Indeed, transforming food system to deliver sufficient affordable healthy diets according to their age, gender, physical activity and physiological status for all people around the world is necessary strategic plan. Besides, overall availability and accessibility of the staple food like cereals, roots and tubers; fruit and vegetables; animal source food should be increased based on the income capacity and lifestyle preferences of the countries. Subsequently, food and agriculture production system worldwide are also facing unprecedented challenge from an increasing demand for food for growing population, rising index of hungry and malnutrition, adverse climate change, overexploitation of natural resources, and food losing and wasting. Therefore, an immediate transition action to Sustainable Food and Agriculture (SFA) required to meet the needs of present and future generations while ensuring profitability, environmental health, and social and economic equity. SFA contributes to all four pillar of food security including availability, accessibility, utilization and stability, which definitely help countries worldwide achieve Zero Hunger and food secured. Meanwhile, the United Nations Network on Nutrition comprised of FAO, WHO, UNICEF, WFP and IFAD are having collaboration in the progress toward ending hunger, achieving food security and improving nutrition of people in all regions. In a nut shell, wide audience including policy makers, academic institutions, general public and international organizations should work hand to hand together and accelerate efforts in combating hungry and malnutrition issues in order to achieve goal in the context of 2030 Agenda for Sustainable Development Goals.



Metal toxicity in foods

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Malaysia is very dependent on using a large number of metals thus lead to a massive mining industry producing a massive concentration of heavy metal. Heavy metals can accumulate in food sources and drinking water, eventually affecting the entire food chain, resulting in food chain contamination. Hence, human health risks may occur through the consumption of fish contaminated by heavy metals. The objective of this study is to assess the environmental and human health risk due to the pollution of toxic heavy metals in the area of Sungai Kuantan, Sungai Riau, and Sungai Pinang. Both water samples and fish samples were collected in selected rivers. Water samples undergo physicochemical analysis for water quality monitoring. The water quality index (WQI) for water samples was calculated based on the physicochemical analysis result. The freshwater fishes were self-collected by using gill nets from the rivers. The fish samples were digested using a microwave digestion system (Multiwave 3000, Anton Paar). Heavy metals concentrations were analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) ELAN 9000. The heavy metals concentrations in freshwater fishes samples were found to be dominated by Fe followed by $Al > Zn > Cu > Ni > As > Pb > Cd$ which ranged between $8.935 \pm 7.713 \text{ mg/kg}$ (Fe) and $0.002 \pm 0.003 \text{ mg/kg}$ (Cd) dry weight. Among the investigated sampling location, Sungai Kuantan demonstrated the highest concentration for Al, Fe, and Zn compared to other rivers. The concentration of Al and Fe in fish tissues at all rivers were above the standard permissible limit. The concentration of Fe is the highest in water compared to other heavy metals but still in natural level except for Al and Fe which exceeded the permissible limit of authorities. Water Quality Index (WQI) of Sungai Kuantan, Sungai Riau, and Sungai Pinang were classified in Class III which are slightly polluted. The calculation of metal pollution index (MPI) was carried out to classify the study area according to the level of contamination and the order of stations from highest to lowest MPI values was Sungai Kuantan > Sungai Pinang > Sungai Riau. The metal pollution index (MPI) analysis revealed that the fishes from the selected rivers are currently not seriously impacted by heavy metal pollution. Risk assessment results showed that the hazard quotient (HQ) and hazard index (HI) values were lower than 1 in all fish species. Thus, suggesting that people would not experience significant health risks from the intake of individual metals through fish consumption.



**Application of drying and modern technologies for Pomegranate
Processing-A Review**

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Dried fruit is fruit from which the majority of the original water content has been removed either naturally, through sun drying, or through the use of specialized dryers. Today, dried fruit consumption is widespread. Nearly half of the dried fruits sold are raisins, followed by dates, prunes, figs, apricots, peaches, apples and pears. Dried fruits are unique, tasty and nutritious and minimally processed ready-to-eat pomegranate arils have become popular due to their convenience, high value, unique sensory characteristics, and health benefits. Pomegranate is one of the most important fruit crops in India because of its adaptable nature, high profitability and being cultivated on a commercial scale in India and the fruits are good source of nutrients and bioactive compounds, mainly anthocyanins which exhibit strong chemo-preventive activities such as anti-mutagenicity, anti-hypertension, anti-oxidative potential and reduction of liver injury. The research on the development of the new pomegranate derived products such as minimally processed pomegranate seeds, jams, marmalades, single strength juices, jellies, juice concentrates, frozen seeds, refrigerated seeds, seeds in syrup, candied arils, arils in brandy and in vinegar, carbonated beverages, pomegranate wine, pomegranate syrup etc. has been carried out. The processed products such as anardana, juice, concentrate; syrup and jelly were highly acceptable because of their nutritive and dessert qualities and palatability. The modified atmosphere packaging offered an additional innovative tool for the optimal use and value addition of lower grade pomegranate fruits. The minimally processed pomegranate arils and frozen arils packed in punnets and pomegranate juice are the most appealing products to consumers than whole fruit. Pomegranate juice can be used in beverages, for jellies, for preparation of pomegranate juice concentrate, as flavoring and colouring agents and for dietetic and prophylactic treatment purposes. This new sector of pomegranate industrial processing will allow the use of non-commercial pomegranate fruits with some physical defects and fruit disorders, having the good quality juice and seeds, to the preparation of these new products, thus improving pomegranate utilization for human health.

Quality Evaluation And Storage Studies On Pomelo Blended Black Grape Jam

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Pomelo filled with nutrients and antioxidants and having sour in taste. Making into a jam increase its shelf life. Black grapes are rich in pectin which helps to attain good colour to jam. The present investigation entitled “Quality Evaluation and Storage Studies on Pomelo Blended Black Grape Jam” was carried out to standardize appropriate combination of Pomelo-Black grape blends for preparation of jam, and also evaluate storage quality of blended products. Pomelo and Black grapes had average weight (1kg and 1kg) and pulp weight (550g and 800g) respectively. The jam were stored at pre-sterilized glass jars and were analyzed Physico-Chemically (moisture, pH, acidity, TSS, total sugars and reducing sugars) Nutrient analysis (Energy, Protein, Carbohydrates, Fat, vitamin C) and organoleptically (colour, taste, appearance, flavour, texture and overall acceptability) during 45 days of storage at room temperature. During storage, a decrease was observed in moisture content (28.1-22%), Titratable acidity (0.75-0.38%), Total Sugars (65.-58%), Reducing Sugars (62-54%), and increase was observed in pH (3.35-3.3%). In nutrient analysis protein (0.53g), Vitamin-C (14.7mg), Fat (0.13g), Carbohydrates (70.68g), Energy (286.5k.cal) respectively. In microbial analysis indicate the jam are microbiologically proper according to standards. In organoleptic analysis jam were accepted by panelists. From overall results it can be concluded showed that all the storage intervals were remains acceptable for 45 days storage at room temperature. Statistical analysis of jam samples revealed that storage intervals had a significant ($p \leq 0.05$) influence on physico-chemical, microbial, nutrient and sensory characteristics of pomelo blended grape jam.

Key words: Pomelo, Black Grapes, Sugars, Nutrients, Jam.



ELISA detection for malignancy using anti-p53 antibodies

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Tumor protein p53 plays an important role in the instruction of cell cycle. It is expressed in high amounts in a variety of transformed cell lines and believed to contribute to transformation and malignancy. The aim of the current study was to detect the serum anti-p53 antibodies in sera of patients with various malignant tumors and to evaluate the sensitivity and specificity of Enzyme-linked immunosorbent assays (ELISA). A case-control study was conducted in 49 patients with various types of malignant tumors at Hospital Sultanah Bahiyah, Alor Setar, Kedah, Malaysia and 32 healthy controls cases with non-malignant disease were collected from USM clinic, Penang. The serum samples of p53 protein and antibodies were analyzed by ELISA technique using commercial kit from the Calbiochem® p53- ELISAPLUS. The results from this study show that, the rate of anti-p53 antibodies in patients with various malignant tumors was 13 from 49 (26.5 %) compared with 2 from 32 (6.25 %) in healthy controls ($P < 0.001$). The sensitivity of this kit was 28.6% and the specificity was 93.8%. In conclusion, the results from this study suggest that the anti-p53 antibodies can be detected in the different sera of malignant tumors patients and the ELISA kit is highly specific nevertheless its discrimination power is not perfect because of low sensitivity to determine the anti-p53 antibodies.



OP 32

An update on virology and molecular pathogenesis of coronavirus disease-2019

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Coronavirus disease 2019 (COVID-19) is an emerging, rapidly spreading pandemic, initially reported in China. Its causative agent was identified as severe acute respiratory syndrome coronavirus 2 (SARS-CoV2). As per the WHO, globally, more than 32.7 million confirmed cases and one million deaths were recorded as on September 28, 2020 indicating major public health threat. SARS-CoV2 is a positive-sense single-stranded- RNA virus with ~ 30 kb size genome belongs to the *Nidovirales*. Molecular analysis revealed that SARS-CoV2 is a variant of SARS-CoV, Middle East respiratory syndrome (MERS)-CoV with some sequence similarity. The confirmed cases and death toll are high in SARS-CoV2 compared to SARS-CoV and the estimated R_0 is >1 . The data on pathological findings on SARS-CoV2 is scarce and present treatment management is based on symptoms which are similar to SARS-CoV. In this paper, we will discuss the virology, transmission and highlighted the recent pathological findings. The reported SARS-CoV2 pathological findings were similar to that of SARS-CoV. Though these findings help to notify the clinical course of disease, it warrants further *in vivo* and *ex vivo* studies with larger samples obtained from the COVID-19 patients.



Indian cultural stratagems: A treasure of medicine for current health and disease prevention

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How people of ancient India had overcome the epidemics and pandemics that arose from time to time, is a million dollar question. We can find a solution by studying the scientific aspects of cultural customs of the ancient societies. Indian - Hindu cultural customs are treasures of scientific strategies for healthy survival of human beings on the globe. Understanding the scientific facets of Indian - Hindu cultural customs help us to find the required solution to prevent and/or cure the diseases arising from time to time and their spread from endemic to pandemic like, COVID-19 (corona virus disease-2019), influenza, meningitis, yellow fever, Ebola, cholera, plague etc. There are many aspects of Indian culture holding scientific background and we can draw inferences from them to prevent and/or cure the communicable diseases. We have reviewed some of the Indian cultural strategies with the modern scientific approaches. We hope this review can change the outlook of people to avoid the spreading of deadly diseases like COVID-19, SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), etc., in all aspects of human life with the treasure of Indian Hindu culture.

Key words

Endemic & pandemic disease; Indian-Hindu customs; COVID-19; SARS; MERS; disease prevention.

OP 33

ISOLATION AND IDENTIFICATION OFFUNGALPATHOGENINFECTIONG BANANA TREES

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Banana is the third important fruit crop after mango and citrus, occupying 8% of the fruit growing area in the State of Andhra Pradesh. Although it is cultivated in almost all the districts, it is extending in East Godavari, West Godavari, Cuddapah, Guntur, Krishna, Visakhapatnam, Vijayanagaram and Kurnool districts. Fusarium wilt disease is a fungal disease caused by a soil pathogen *Fusariumoxysporum*. These fungal spores present in the soil or in the infected planting material finds entry through the roots and into the rhizome of the healthy banana plant. In the present study these fungi were isolated from small Pieces (sterilized with 5% sodiumhypochlorite) of leaf, corm, Pseudostem and fruit from diseased samples and Cultured on a potato dextrose agar [PDA] medium. Growing colonies of fungi were purified by single spore and hyphal tip method. Based on the morphological characters and pathogenicity tests, the isolated fungalspecies were identified as *Fusariumoxysporum*.

KEYWORDS: Fusarium wilt, *Fusariumoxysporum*, Musa acuminate.

OP 34

Watermelon Trichome GWAS Identified Tetratricopetide-Repeat Gene Involved in Trichome Morphogenesis, Growth and Development, and Seed Size

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GWAS analysis identified a Tetratricopetide-Repeat (TPR) gene strongly associated with trichome length in watermelon accessions. The orthologue of watermelon TPR identified in Arabidopsis thaliana and reverse genetics approach employed for further functional characterization. The Arabidopsis tpr mutant showed a severely distorted trichomes, altered growth and development, as well as increase in the seed size. Genetic analysis revealed that TPR might interact with a multiprotein complex that mediates actin polymerization or actin-related filament assembling to maintain trichome morphology.



OP 34a

**Tragacanth Gum Based Interpenetrating Polymeric Hydrogel Network For
In Vitro Anticancer Drug Release Applications**

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The paper describes the development of dual responsive IPN hydrogel from tragacanth gum with temperature & pH sensitive monomers by a simple free radical polymerization using N,N'-methylene-bis-acrylamide as a crosslinker and potassium per sulphate as an initiator. These hydrogels were successfully characterized by the FTIR, DSC and XRD to know the chemical structure, thermal and crystalline nature. The temperature and pH-sensitive swelling behavior of IPN hydrogels were investigated in different pH solutions and temperature. The in vitro drug release profiles will be performed in pH 1.2 & 7.4 and temperatures 25 and 37 °C. The release of drug *n* values occurred through fickian diffusion mechanism and best fitted the Korsmeyer-Peppas model. The release mechanism will be analyzed by evaluating the swelling release data using different empirical equations.

Keywords: Tragacanth gum, Dual responsive behavior, Anticancer drug, Drug delivery.

Exposure of zestoretic to pregnant rats alters developmental landmarks in the young ones

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Zestoretic, is a combination of lisinopril and hydrochlorothiazide used as anti-hypertension drug in humans including during pregnancy. No reports are available to know the role of zestoretic in the developmental landmarks of prenatal exposed young ones and behavior of pregnant women. The present investigation aimed to study the effect of zestoretic on behavior and developmental landmarks of Wistar rats. Zestoretic (lisinopril varied concentrations + hydrochlorothiazide 12.5mg) at a dose of 25, 50 and 100 mg/Kg body weight were administered orally to three different groups of inseminated rat on gestation days 7, 9, 11 and 13, whereas controls were administered with distilled water. Controls and experimental groups could deliver pups and zestoretic. No clinical signs of toxicity were observed in the behavior of experimental animals during experimentation when compared to controls except few dams from 50 and 100 mg/Kg body weight received which shown aggressive behavior. The developmental land marks, such as pinna attachment, ear opening, fur development, eye opening, upper and lower incisor eruption, crown rump length, vaginal opening and testes descend were measured periodically on their post-natal days from all the groups. The number of live pups in zestoretic 50, 100 mg/Kg body weight administered females are significantly less when compared to controls and other experimental groups. Significant decrease in the survival index of pups in 50, 100 mg/Kg body weight zestoretic administered female group was observed and no significant decrease in control and 25 mg/Kg body weight. There is two- or three-days delay in early onset of puberty in females (vaginal opening) and testes descent in males of experimental groups were also observed. Body weights, crown rump length, anogenital distance and eye opening of control and exposed animals were measured on postnatal day (PND) 1, 7, 14 and 21 and found change. No significant change was observed in pinna detachment, ear opening, fur development, upper and lower incisor eruption in experimental groups when compared to controls. It was concluded that zestoretic has interferes in developmental landmarks in rat.

Key words: Zestoretic, Prenatal, Developmental landmarks, Puberty, Testes descent.

**Green Synthesis of Silver Nanoparticles Using Fresh Water Microalgae
Spirogyra sp. and Their Anti-Bacterial Activity**

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Green synthesis of nanoparticles was gaining importance for their utility in various fields including pharmacology, medicine, agriculture etc., Less or scanty information is available in the area of freshwater algal research and their potential usage in nanoparticle synthesis. In the present study, freshwater algal biomass of *Spirogyra* sp. collected from the Penna river basin from Siddavatam was culture established in net house conditions of YVU, YSR Kadapa Dist., AP., India was used for the Silver nanoparticles biosynthesis. The green synthesis of silver ions (Ag⁺) shows a yellow color solution to red color extract and these silver nanoparticles synthesis having an absorption peak at 430nm under the UV-visible spectrum. Further these nanoparticles were characterized by using a UV-visible spectrophotometer, scanning electron microscopy (SEM), EDX, Fourier Transform Infra-Red (FTIR), Dynamic light scattering (DLS). The average size of the nanoparticle size was estimated to be around 28-58 nm and the antimicrobial activity of SNPs was tested Gram-positive bacteria like *Bacillus subtilis*, *Staphylococcus aureus*, *Clostridium sporogenus*. Gram-negative bacteria as *Echeresia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* by measuring the inhibition zone and result confirmed that Silver nanoparticles can be an antimicrobial agent against some pathogenic microbes.

Keywords: Fresh Water Algae, Green synthesis, Silver nanoparticles, Antibacterial activity



Dot-Blot Assay: A Rapid and relayable method for the Detection of Lymphatic Filariasis

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WHO launched the global programme to eliminate lymphatic filariasis (GPELF) in 2000 to initiate activities to eliminate lymphatic filariasis (LF) as a public health problem, a goal subsequently targeted for 2020. The ongoing DEC based mass drug administration as part of global filarial elimination programme requires a sensitive, reliable detection assay to monitor the treated population, to ensure the transmission of infection and further surveillance.

An immunodominant seroreactive clone, WbL₁, was identified through immuno-screening of a *Wuchereria bancrofti* L3 complementary DNA library. Recombinant WbL1 (rWbL1) was analyzed with sera from *W. bancrofti* patients. Diagnostic evaluation was carried out by developing a simple and effective dot blot assay method to detect the filarial-specific IgG4 antibodies in various categories of filarial sera samples against recombinant WbL1 (rWbL1) protein.

Performance parameters of the test displayed significant sensitivity and specificity values up to 93.3% and 96.7%, respectively. Our results showed filarial antibodies against rWbL1 to be highly reactive with microfilaremic and clinical filarial sera samples compared with the endemic and non-endemic control sera samples. The anti-WbL1 IgG4 detection test can be considered as a field test for initial screening and epidemiological monitoring of filarial infections in filariasis-endemic areas.



Non albicans Candida: Emerging heterogeneous pathogens isolated from diabetic patients

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Yeast like fungi usually dimorphic in nature considered as nonpathogenic or less virulent now recognized them as a primary cause of morbidity and mortality in immunocompromised and severely ill patients. *Candida* spp. is the most common opportunistic fungal pathogens; Now a days the incidence of *C. albicans* is declining throughout the world. It has been reported that, gradually decreasing the *C. albicans* infections have been replaced by *non albicans candida* infections. The most important predisposing factors are an ever-expanding population with mucosal or cutaneous barrier disruption, as well as the quantitative or qualitative dysfunction of neutrophils or of cell-mediated immunity and metabolic disorders.

We enrolled a total of 125 subjects (both diabetic and non diabetic among 67 males, 58 females) with an average age ranging from 20 to 80years including smoking (24), nonsmoking (101), among the total subjects symptomatic 28%, The incidence of candidiasis caused by non-albicans *Candida* (NAC) species (67.6%) was higher than *Candida albicans*(32.3%). Among the virulence factors secreted by the pathogens we found *C. parapsilosis* and *C. ontarionsis* species secreted the maximum phospholipase enzyme. In case of protease production *C. parapsilosis* and *C. tropicalis*-2 species secreted the maximum protease enzyme. The haemolysin activity and their fluctuations were expressed in the form of Hz values. Except *C. ontarionsi* all most all test organisms were showed the very strong hemolytic activity with high Hz values. *C. ontarionsi* is medium producer. The highest and lowest coagulase activity was observed with *C. ontarionsi* and *C. parapsilosis* respectively. We also tested the antifungal activity with plant extracts found encouraging results.

Hepatoprotective and Antioxidant Activity of Methanol Roots Extract of *Mitragynainermisin* Paracetamol-induced Rat Liver Damage.

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Liver disease is one of the major health problems worldwide. Since pre-historical times, plant materials have widely been used for treatment of different diseases including liver diseases. This research was aimed at evaluating the hepatoprotective and antioxidant activity of *Mitragynainermisin* paracetamol-induced liver damage in albino rats. The roots of *Mitragynainermis* were extracted with methanol and the extract was subjected to phytochemical screening using standard procedures. Forty one (41) male and female albino rats weighing 150-200g were used for this study. Five rats were used to determine the LD₅₀ using a limit dose test method. To access the hepatoprotective activity, rats were randomly divided into six groups of six animals each. Group 1, Group 2 and Group 3 served as normal, paracetamol-induced and positive controls and received distilled water (10ml/kg b.w.), paracetamol (600 mg/kg b.w), and silymarin (100 mg/kg b.w) respectively once daily for 14 days. Group 4, Group 5 and Group 6 received 100 mg/kg b.w., 200 mg/kg b.w and 300 mg/kg b.w of the methanolic root extract of *Mitragynainermis* respectively for 14 days. Following 14 days of treatment, all the animals were anesthetized with chloroform, sacrificed and blood collected for biochemical analysis. The results showed that phytochemical screening revealed the presence of tannins, saponin, glycosides, alkaloids, cardiac glycosides, steroids, saponin, glycosides, balsams, anthraquinones and volatile oils. The median lethal dose (LD₅₀) was estimated to be greater than 3000mg/kg. In the sub-chronic (14 days) study, paracetamol-induced control significantly ($P > 0.05$) elevated in ALT, AST, ALP, TB and DB while TP and ALB decreased significantly ($P > 0.05$) when compared with normal control respectively. However, oral treatment with extract and silymarin exhibited a significant ($P > 0.05$) reduction in serum biochemical marker levels of ALT, AST, ALP, TB and DB while significantly ($P > 0.05$) increasing in TP and ALB when compared to paracetamol-induced control respectively. The paracetamol-induced control had significantly ($P > 0.05$) decreased the levels of vitamin E and vitamin C when compared to normal control rats. Upon treatment with extract and silymarin, there was significant ($P > 0.05$) increase in vitamin E and vitamin C level compared with paracetamol-induced control. The paracetamol-induced control had significant ($P > 0.05$) reduction in the level of GSH, SOD, CAT and

GPx when compared to the normal control. When treated with extract and silymarin, there was a significant ($P > 0.05$) increase in the levels of these parameters compared to paracetamol-induced control. From the results, it can be concluded that the methanol root extract of *Mitragynanthera* possess hepatoprotective activity against paracetamol-induced rat liver damage. This hepatoprotective potential could be due to the presence of some phytochemicals identified.

Keywords: *Mitragynanthera*, Hepatoprotective, Antioxidant Activity, some phytochemicals

OP 40

MICROBIAL MINING, A COST-EFFECTIVE PROSPECTING TECHNIQUE FOR SAFE ENVIRONMENT

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Traditional mineral extractions involve many expensive steps like digging, material conveyance, roasting and smelting etc., and require sufficient concentrations of corresponding minerals. Furthermore, they pose lot of environmental queries and creating hardship by harming environment. Microbial mining (Biomining) is an alternative and new technique for potential extraction of minerals like copper, iron, uranium, gold, silver, aluminium, nickel, cobalt, titanium, molybdenum, zirconium, zinc etc (Mohd. Haris Siddiqui et al, 2009). Microorganisms like Bacteria and Fungi are employed in mining for winning the mineral and metals concentrations. The species involved in biomining include *Acidithiobacillus ferrooxidans* (*Thiobacillus ferrooxidans*), *Leptospirillum ferrooxidans*, *Leptospirillum ferriphilum* for extraction of iron bearing minerals, *Acidithiobacillus thiooxidans* (*Thiobacillus thiooxidans*), *Acidithiobacillus caldus* (*Thiobacillus caldus*) for extraction of sulphur bearing minerals like copper, lead zinc, gold, uranium etc., (Mohd. Haris Siddiqui et.al., 2009; Clark, D.A., et al., 1999; Leduc, et al, 1994). Two fungi species *Aspergillus niger* and *Penicillium simplicissimum* were able mobilize Copper, Tin, Aluminium, Nickel, Lead, Zinc by more than 95% (Brauer, H., 1991; Mohd. Haris Siddiqui et. al., 2009). Though it is a new technique which is moderately

promising and still need auxiliary research, countries like Spain, USA, Chile, Australia, Mexico, Ghana, Zambia and Bagdad (Moris Cummins 2005) have adopted biomining in mining and mine waste treatment.

OP 41

INHIBITION OF KEY ENZYMES LINKED TO SNAKE VENOM INDUCED LOCAL TISSUE DAMAGE BY KOLAVIRON

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Background: Snakebite envenoming is an important public health problem that threaten the lives of healthy individuals especially in many tropical countries like Nigeria. Antivenins, the only efficient approach for snakebite envenoming, are limited in their efficacy in the neutralization of local tissue damage. Snake venom phospholipase A₂ (PLA₂) protease, hyaluronidase and L-amino acid oxidase (LAAO) are the major hydrolytic enzymes involve in local tissue damage. Therefore, this study evaluates the inhibitory effect of kolaviron (KV) against *Naja n. nigricollis* (NNN) snake venom hydrolytic enzymes involved in local tissue damage.

Methods: Kolaviron was evaluated for its ability to inhibit the hydrolytic enzyme activities of NNN venom phospholipase A₂ (PLA₂) protease, hyaluronidase and L-amino acid oxidase (LAAO). Present study also deals with the neutralization of NNN venom enzyme(s) induced complications such as myotoxic, edemic, haemolytic and procoagulant effects.

Results: Kolaviron inhibited the PLA₂, protease, hyaluronidase and LAAO enzyme activities of NNN venom in a dose dependent manner. Furthermore, myotoxic, edemic, haemolytic and procoagulant effects induced by NNN venom enzyme were neutralized significantly ($P < 0.05$) when different doses of KV were pre-incubated with venom before assays.

Conclusions: These findings clearly present kolaviron as a potent inhibitor against NNN venom hydrolytic enzymes involved in local tissue damage and may act by either forming an inhibitor-enzyme complex that restricts the substrate availability to the enzyme or direct binding to the enzyme active site that affects the enzyme activity thereby mitigating venom induced toxicity.

Keywords: Antivenin, hydrolytic enzymes, Inhibition, kolaviron, local tissue damage, *Naja nigricollis nigricollis* venom

Evaluation of the Antibacterial Activity of Endophytic Fungi Isolated from Leaves of *Mentha piperita*

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Endophytes are microorganisms that colonize internal plant tissue and can live there for all or part of their life cycle without causing any apparent damage or disease to the host plant. Endophytes are reported to be potential source of new natural bioactive compounds. This study was carried out to evaluate the antibacterial activity of endophytic fungi isolated from leaves of *Mentha piperita*. Endophytic fungi were isolated from health leaves of *Mentha piperita*, a medicinal plant found in Nigeria and used in the treatment of different diseases. The fungal isolates were preliminarily screened for antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Fungal isolates that showed activity were inoculated into Malt Extract Broth and incubated at 25°C for 14 days in a shaker incubator. Ethyl acetate extracts of the culture filtrates were used to determine the antibacterial activity of the isolates using agar-well diffusion method. Nineteen endophytic fungi were isolated from health leaves of *Mentha piperita* out of which six isolates had antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Ethyl acetate extracts of these endophytic fungi had activity against the test bacteria with mean zones of inhibition ranging from 14±0.67 mm to 26±0.33 mm. Endophytic fungi isolates from healthy leaves of *Mentha piperita* demonstrated ability to produce bioactive compounds with antibacterial potentials. These bioactive compounds can serve as a biological source of new drug candidates.

Keywords: endophytes, fungi, antibacterial, *Mentha piperita*, bioactive.



ROLE OF VITAMIN D IN COMBATING COVID 19 – A REVIEW

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WHO declared COVID-19 caused by the virus SARS-CoV-2 a global pandemic. We should delineate the potential protective factors against COVID-19. Vitamin D is a micronutrient which is essential to help maintain bone and musculoskeletal health. However, recent research has highlighted a crucial supportive role for vitamin D in immune cell function, particularly in modulating the inflammatory response to viral infection. Vitamin D is produced endogenously with the effect of [ultraviolet radiation](#) on the skin or available from exogenous food sources or dietary supplements. Evidence supporting the role of vitamin D in reducing risk of COVID-19 includes that the outbreak occurred in winter, a time when 25-hydroxyvitamin D (25(OH)D) concentrations are lowest. Spain and Italy (particularly Northern Italy), had low mean concentrations of 25(OH)D and high rates of vitamin D deficiency. These countries have also been experiencing the highest infection and death rates in Europe. The northern latitude countries (Norway, Finland, and Sweden) which receive less UVB sunlight than Southern Europe actually had much higher mean 25(OH)D concentrations, low levels of deficiency and for Norway and Finland, lower infection and death rates. The correlation between 25(OH)D concentration and mortality rate reached conventional significance ($P=0.046$) by Spearman's Rank Correlation. Factors associated with worse COVID-19 prognosis include old age, ethnicity, male sex, obesity, diabetes and hypertension and these also associate with deficiency of vitamin D or its response. Experimentally, vitamin D increases the ratio of angiotensin-converting enzyme 2 (ACE2) to ACE, thus increasing angiotensin II hydrolysis and reducing subsequent inflammatory cytokine response to pathogens and lung injury. Global data correlates severe Vitamin D Deficiency with COVID-19 associated coagulopathy, disrupted immune response and mortality, reduced platelet count, and prolonged prothrombin time, together suggesting benefits from supplementation. Many clinical trials are underway globally to delineate the role of vitamin D in both prevention and treatment of COVID-19.

Key Words: Micronutrient, Inflammatory, Coagulopathy, Angiotensin Converting Enzyme.



OP 44

Transcriptomic profiling identified altered expression of genes associated with testicular functions in adult F1 rats exposed to carbimazole during embryonic period

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The central goal of this study was to investigate the genetic makeup of testis in F1 generation adult rats exposed to carbimazole prenatally. At post-natal day 100, the testis of rats delivered to carbimazole exposed (time-mated pregnant rats orally administered with carbimazole from gestation day 9 to 21) and control (untreated pregnant rats) groups were subjected to transcriptomic analysis using NGS platform. A total of 187 differentially expressed (up regulated: 49 genes; down regulated: 138) genes were identified in carbimazole exposed rats over controls and the major processes associated with these altered testicular transcripts were examined. Functional clustering analysis suggest that the involvement of identified DEGs were linked to intrinsic and extrinsic apoptotic pathways, mitochondrial solute carriers slc25a members, nuclear receptors/zinc family members, steroidogenic pathway and cholesterol synthesis, and growth factors and protein kinases and thus represent potential mediators of the developmental toxic effects of carbimazole in F1 generation rats. Based on the findings, it can be concluded that prenatal exposure to carbimazole prominently affects expression of multiple transcripts implicating key regulatory events associated with testicular functions, spermatogenesis and steroidogenesis in rats at their adulthood. These results support our earlier findings and hypothesis. This background information obtained at the testicular transcriptome during gestational hypothyroidism might be helpful for future studies and experiments to gain additional in-depth analysis and to develop strategies to protect F1 generation male reproductive health.

Key words: Apoptosis, carbimazole, oxidative stress, spermatogenesis, steroidogenesis, transcriptome, rats

OP 45

Proximate and antioxidant activity of traditional minor millets cultivated and consumed in Rayalaseema region of South India

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Millets have been recognised as nutri-cereals and climate resilient crops and are traditionally consumed as staple food by millions of people living in the food insecure arid and semi-arid parts of the developing countries of Africa and Asia. Minor millets continue to receive very little attention due to the lack of scientific input towards their nutrient profiling and antioxidant potential especially millet cultivars of Rayalaseema region, about which much less information is available. Proximates including total dietary fibre, polyphenols, and antioxidant potential of various minor millets (finger, foxtail, proso, little, barnyard and kodo millets) and their cultivars, traditionally grown and consumed in the Rayalaseema region of south India were studied. Results indicate that protein content of investigated minor millets ranged between 78-134 g kg⁻¹ (sorghum 89-110 g kg⁻¹). The fat content values were between 21 - 41 g kg⁻¹ (sorghum 23-28 g kg⁻¹). Starch content of minor millets ranged between 453-656 g kg⁻¹ (sorghum 710-738 g kg⁻¹). The amylose content of millets varied from 89 to 175 g kg⁻¹ (sorghum 108-187 g kg⁻¹). Further moisture content of minor millets ranged from 83 to 87 g kg⁻¹ (sorghum 81-99 g kg⁻¹) and ash content ranged between 28 and 39 g kg⁻¹ (sorghum 9.2-17.5 g kg⁻¹). The total dietary fibre content ranged from 121 to 331 g kg⁻¹ (sorghum 25-90 g kg⁻¹) and total phenol content values between 0.66 and 2.00 g kg⁻¹ (sorghum 0.16-0.36 g kg⁻¹). The radical scavenging capacity of minor millets ranged from 3.7 % to 21.5%. Ascorbic acid equivalent antioxidant activity ranged from 180 mg kg⁻¹ to 600 mg kg⁻¹. Minor millets are nutritionally rich in protein, fat, ash, fibre and Total Phenol Content with appreciable antioxidant capacity; while they have lower moisture, starch and amylose content as compared to the major millet, sorghum. Minor millets can combat micronutrient malnutrition as higher ash content of minor millets is indicative of its rich mineral content. Finger and kodo millets were found to be nutritionally superior over other minor millets studied. The results suggest that minor millets have a potential to provide food security.

Phytochemical screening by Fourier Transform Infra-Red Spectroscopic analysis and GC-MS of *Caralluma bhupenderiana* Sarkaria-An edible succulent plant

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The present investigation was focused on the phytochemical components which are proactive and present in the *Caralluma bhupenderiana* Sarkaria. Preliminary screening was carried out to detect the possible phytochemical compounds from methanolic, ethanolic and aqueous extracts of *Caralluma bhupenderiana* Sarkaria. Upon screening of these extracts, it was found that the methanolic extract was enriched with flavonoids, cardiac glycosides, quinines, phenols and saponins. Further studies were carried out to identify active functional groups present in the *C. bhupenderiana*. In addition the methanolic extract was analysed with GC-MS to determine effective bioactive compounds present in this extract. The GC-MS analysis revealed that *C. bhupenderiana* consists of 2,2- Methylenebis (3,4,6- trichloroanisole) at 4.27 RT (Molecular formula – $C_{15}H_{10}Cl_6O_2$, Bicyclo(2.2.1) heptanes, 2,2,3,5,5-pentachloro- 7,7-bis (chloromethyl)-1- dichloromethyl at 4.27 RT (Molecular formula- $C_{10}H_9Cl_9$), Corynan- 17-ol, 18,19- didehydro- 10- methoxy at 4.2 RT (Molecular formula- $C_{20}H_{26}N_2O_2$), 8-Nonynoic acid at 24.02 RT (Molecular formula $C_9H_{14}O_2$), 9, 12, 15- Octadecatrienoic acid,(Z,Z,Z) at 24.02RT (Molecular formula – $C_{18}H_{30}O_2$), Octadecatrien – 1-ol, (Z,Z,Z) at 24.02 (Molecular formula $C_{18}H_{32}O$).Methyl 11- Oxo- 9- undecenoate at 26.87 RT (Molecular formula $C_{12}H_{20}O_3$, 2-Doecenal, (E) at 26.87 RT (Molecular formula $C_{12}H_{22}O$), Hexadecenoic acid, methyl ester, (Z)- 26.87 (Molecular formula $C_{17}H_{32}O_2$). In order to conform these results samples were analysed with FT-IR to match the functional groups. Further studies in the direction of identifying the *in vitro* therapeutic potential are under progress.

Key Words - Preliminary screening, Fourier Transform Infra-Red Spectroscopic analysis, GC-MS.

Characterization of *Gluconacetobacter diazotrophicus* in various crops for nitrogen-fixing potential

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Gluconacetobacter diazotrophicus is a nitrogen-fixing bacterium that has been found first to colonize in *Saccharum* spp. *G. diazotrophicus* is of great interest for sustainable agriculture because it is able to fix nitrogen at low pH values and high sugar concentrations, and can excrete approximately half of the concentrated nitrogen on potential forms that can be assimilated by the plants. *G. diazotrophicus* was isolated from sugarcane (NFGS), maize (NFGM), pineapple (NFGP) and carrot (NFGC). A total of 113 isolates were isolated from four different crops and screened for various traits like nitrogen fixation, phytohormone production like IAA and GA, phosphorus and zinc solubilization. Out of 113 isolates ten efficient ones from various crops were selected based on nitrogen fixing capacity. The isolate from sugarcane NFGS25 fixed maximum nitrogen i.e., 147 μg of N/mg of carbon utilized and produced maximum concentration of indole acetic acid (4.94 $\mu\text{g}/\text{ml}$) and gibberellic acid (7.1 $\mu\text{g}/25\text{ml}$). The isolate NFGS25 showed phosphorus solubilization zone of hydrolysis 2.1cm whereas zone of zinc solubilisation of 3.5cm. The endoglucanase enzyme activity was estimated spectrophotometrically. The results of the work demonstrated that all the twenty isolates and the reference strains were capable of producing endoglucanase. The highest endoglucanase activity was exhibited by NFGS25 (86 μgml^{-1}) followed by NFGS26 (81 μgml^{-1}) isolated from sugarcane. The lowest endoglucanase activity was shown by NFGC16 (17 μgml^{-1}) isolated from carrot. The highest capacity of *G.diazotrophicus* strain NFGS25 isolated from sugarcane to produce endoglucanase in the presence of enzymatic substrate and sucrose may be a potential mechanism of adaptation of these bacteria to colonize plant roots and the strain can thus be implicated in microbial based nitrogen fixation.

Key words: *Gluconacetobacter diazotrophicus*, nitrogen fixation, endoglucanase activity, sugarcane.

**Gas Chromatography – Mass Spectrometry (GC – MS) analysis of
Boucerosia procumbens Gravelly & Mayuranathan -An edible succulent
plant**

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Plants are rich source of several types of bioactive compounds that could be used for the treatment of many diseases. *Boucerosia procumbens*, is an endangered, endemic xerophytic succulent and is one of the under explored important medicinal plants belonging to the family Apocianaceae. The present investigation is focused on identifying the proactive phytochemical components present in the *Boucerosia procumbens*. Preliminary screening was performed in methanolic, ethanolic, and aqueous extracts of *Boucerosia procumbens*. The results showed that methanolic extract was enriched with flavonoids, cardiac glycosides, tannins, terpenoids, quinines, phenols and saponins. In order to determine the specific and effective bio active compounds present in *B. procumbens*, methanolic extracts was analyzed through Gas Chromatography – Mass Spectrometry (GC – MS). The results of this study revealed that the extract contained significant levels of Urs-12-en-24-oic acid, 3-oxo-, methyl ester(53.93%), α -Amyrin (14.06%), ζ -Sitosterol (9.77%), Stigmasterol (7.40%), Campesterol (7.40%), Squalene(5.20), Bufa-20,22-dienolide, 3,14-dihydroxy-, (3 α ,5 α)-(2.24%). The current study suggested that potential bio-compounds present in *B.procumbens* may have a vital role to play in designing new drugs and also in development of novel therapeutic strategies.

Key words: *Boucerosia procumbens*, preliminary screening, GC-MS



OP 49

EDIBLE AGAR BASED FILMS FOR CHILLI FRUITS PRESERVATION AND RIPENING

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Agar is a food grade biopolymer has been widely used as an edible coating for extending the shelf life of fruit and gelling agents in fruit jams. The techniques which developed for low cost and long shelf life of agricultural products is always entertained in agribusiness. In this perspective, we are the world's largest chilli producer, but we are lagging behind with poor storage techniques. Edible coating of agar on chilli (*Capsicum annum* L.) fruits were attempted for long term storage (at 4°C) to boost up the crop value. The effect of various concentration (0.5, 1 and 1.5 % w/v) aqueous formulations of agar on weight loss and ascorbic acid levels were investigated. Biochemical analyses were conducted to monitor the changes in capsaicin, carotenoids, and antioxidants. The results showed that coated fruits demonstrated fastened ripening processes and desired biochemical changes compared to the uncoated fruits. This also confirmed by the reduction in weight loss and ascorbic acid increment in comparison to the uncoated chilli. Weight loss and ascorbic acid increment with increasing agar-agar concentration and 1.5% (w/v) agar-agar was proved to be the most suitable coating. This aqueous based coating process can be easily acquired by farmers. Since, chilli is a perennial crop they can assure stable supply with respect to demands throughout the year. Especially in this economic slowdown due to Covid-19 pandemic, farmers can minimise the quality loss and postpone the marketing of chillies until their desired demand raised.

Keywords: Chilli, agar-agar, shelf-life, weight loss, agribusiness



Effect of gossypol on the growth and gut proteolytic enzymes in fall armyworm, *Spodoptera frugiperda* (J.E. Smith)

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The fall armyworm, *Spodoptera frugiperda* (J.E. Smith), is a native species of tropical and subtropical regions of the America. The effect of gossypol, a terpenoid present in cotton, was evaluated on the growth and metabolism of *S. frugiperda* under laboratory conditions. Bioassays were conducted on gossypol by incorporating in artificial diet at different concentrations (100 to 500 µg) following the diet overlay method. After 18 h of feeding the protease activity, antioxidant enzyme activity and oxidative stress parameters were assessed. Bioassays indicated that gossypol reduced the weight gain of the larvae in a dose-dependent manner, at 500 µg the larval weight gain was significantly reduced (-039 mg/ larvae) compared to control larvae (162 mg/larvae). The activities of trypsin, chymotrypsin and aminopeptidase were inhibited in a dose-dependent manner, and at 500 µg gossypol the activities were significantly reduced (4.01, 5.41 and 6.47 U/mg protein) compared to the control larvae (8.22, 21.01 and 19.26 U/mg protein, respectively). In contrast, the activities of antioxidant enzymes and oxidative stress parameters were increased in a dose-dependent manner. At 500 µg the activities of catalase and polyphenol oxidase were significantly increased (4.16 and 9.93 U/mg protein) compared to the control larvae (2.25 and 5.67 U/mg protein, respectively). At 500 µg H₂O₂ content and lipid peroxidation were significantly increased (978.53 and 0.44 µmoles/mg protein) compared to the control larvae (13.72 and 0.11 µmoles/mg protein, respectively). The results therefore indicated that gossypol induced the toxicity to the insects by inhibiting the proteolytic enzymes and inducing the oxidative stress thereby affecting the growth and development of the larvae.

Keywords: *S. frugiperda*, gossypol, protease enzymes, antioxidant enzymes, oxidative stress.



Effect of tartrazine, a food coloring agent on testicular functions in diabetic rats

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The present study was aimed to investigate the probable effect of tartrazine, a food coloring agent on male reproductive health in streptozotocin-induced diabetic rats. Injection of streptozotocin resulted in significant reduction in the weights of testis, epididymis, seminal vesicles and prostate gland, serum testosterone levels and the activity levels of testicular 3 β - and 17 β -hydroxysteroid dehydrogenases accompanied by a significant increase in the circulatory levels of gonadotropins, follicle stimulating hormone and leutinizing hormone in rats over controls. The testicular daily sperm count, and cauda epididymal sperm count, sperm viability and sperm membrane integrity reduced significantly in rats subjected to streptozotocin as compared to controls. In the testis, streptozotocin showed significant elevation in the lipid peroxidation levels accompanied by a significant reduction in the activity levels of superoxide dismutase and catalase over untreated rats. A significant decrease in the StAR protein mRNA expression levels in the testis was observed in streptozotocin injected rats over control group. The testicular architecture was disorganized in streptozotocin treated rats over controls. Oral administration of tartrazine further deteriorated the selected reproductive variables accompanied by further increase in the serum gonadotropins in streptozotocin-induced diabetic rats as compared to streptozotocin alone treated rats. From the results, it can be concluded that the administration of tartrazine exacerbates the adverse effects of streptozotocin on testicular functions.



Rapid synthesis of silver nanoparticles using culture supernatants of Kombucha drink

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The development of reliable processes for the synthesis of silver nanomaterials is an important aspect of current nanotechnology research. Reports on the cell-associated biosynthesis of silver nanoparticles using microorganisms have been published, but these methods of synthesis are rather slow. In this study, we report on the rapid synthesis of metallic nanoparticles of silver using the reduction of aqueous Ag^+ ion using the culture supernatants of Kombucha, a fermented tea. The synthetic process was quite fast and silver nanoparticles were formed within 30 min of silver ion coming in contact with the cell filtrate. Through a limited screening process involving a number of common microorganisms, we observed that the culture supernatants of different bacteria of kombucha consortium were potential candidates for the rapid synthesis of silver nanoparticles; further, we revealed that this method of synthesis requires far less time than previously published biological methods. Our investigation also showed that tannins can partially inhibit the reduction of Ag^+ to metallic silver nanoparticles by kombucha consortium.

Keywords: Kombucha, Silver, Consortia, Nanparticles, Rapid synthesis

Role of Thymic Tolerance in Autoimmune Diseases

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The thymus, a major lymphoid organ, provides a place for T cell development through positive and negative selection. Following positive selection, T cells enter negative selection, in which T cells interact with medullary thymic epithelial cells (mTECs) and dendritic cells within the medullary area to delete self-reactive T cells or to generate suppressive regulatory T cells (Tregs), facilitating the establishment of central tolerance. Defects in mTEC development impair central tolerance and cause autoimmune disease. Thus, autoimmune diseases are caused by a failure of central tolerance, genetic and environmental abnormalities resulted in the imbalance of immunoregulatory and inflammatory processes. Autoimmune diseases exhibit systemic inflammation, which causes severe organ damage or death. Mobile inflammatory cells transduce signals among different organs, initiating the development of disease. STAT3, NF- κ B and inhibitor of NF- κ B kinases (IKK) are broadly expressed in both inflammatory cells and epithelial cells and are required for the development of lymphocytes, lymphoid organs, and some epithelial tissues. Defects in these signaling molecules are associated with autoimmune disease. However, how STAT3, NF- κ B/IKK-mediated signaling orchestrates the connection between different cells to initiate the pathogenesis of their associated diseases remains to be revealed. We identified the association of reduced thymic medullary regions, systemic inflammation, and severe skin damage in *Ikk α* knockout mice. Our data reveals the crucial pathways, which connect defective central tolerance associated-self-reactive T cells to severe autoimmune disease development. Nanotherapy using TNT strongly supports an immunosuppressive role to control the development of EAE and CIA with potential applications in the treatment of autoimmune diseases. Preclinical models of autoimmune disease showed a role for the thymus in autoimmune diseases. Unfortunately, our knowledge of thymus biology and of methods for modeling human thymopoiesis in vitro remains limited. As a consequence, the practicality of these potential therapeutic measures in preclinical disease models and in the clinical context remains largely untested. Future research should therefore focus on efforts to bridge this restrictive knowledge gap between preclinical and clinical studies.



Food Security of Genetically Modified Food (GMF)

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Genetically modified foods (GM foods), also known as genetically engineered foods (GE foods), or bioengineered foods are foods produced from organisms that have had changes introduced into their DNA using the methods of genetic engineering. Genetic engineering techniques allow for the introduction of new traits as well as greater control over traits when compared to previous methods, such as selective breeding and mutation breeding.

Agriculture biotechnology is the use of new scientific techniques based on our understanding of DNA to improve crops and livestock that are not possible which conventional breeding alone. Another aspects of agriculture biotechnology involves the use of recombinant DNA. Unlike molecular plant breeding, however, recombinant DNA technology result in new traits that cannot be achieved by conventional and traditional ways. The genetic engineering of crops for improved agronomic and nutritional traits has been widely received in the literature of briefly.

A well known example of transgenic plant is Golden Rice, which expresses β -carotene and was created philanthropically with the intent of alleviating vitamins. Crops developed through biotechnology, specifically, transgenic crops, are being designed to address many of the worlds significant agricultural challenges.

Key words: Genetically modified food, conventional breeding, transgenic plants



Targeting mLST8 protein in Cancer by novel chemical molecules using Bioinformatics approaches.

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Mammalian lethal with SEC13 protein 8 (mLST8), is an indispensable protein subunit of mammalian target of rapamycin (mTOR) signaling pathway that interacts with the kinase domain of mTOR protein, thereby stabilizing its active site. Experimental studies reported the over expression of mLST8 in human colon and prostate cancers by activation of both mTORC1/2 complexes and subsequent downstream substrates leading to tumor progression. Considering its role, targeting mLST8 protein would be a therapeutic approach against tumor progression in colon and prostate cancers. Hence, using in silico structure based drug design approach, the comparative binding patterns of 1, 10-bisnaphthyl-2,20diol (BINOL), 1-(2-carboxynaphth-1yl)-2-naphthoic acid (SCF-12) and their analogs in the cavity of mLST8 were explored. ADME and binding energy calculations led to the identification of five compounds with favourable Glide (G) scores and implicated the importance of Asn132 and Gln225 as key binding residues. Molecular dynamics (MD) simulations and free energy landscape (FEL) approaches helped in elucidating the binding mechanism and suggested the possibility of ligands 1–3 namely, ZINC01765622, ZINC62723702 and ZINC02576980 to be promising antagonists for mLST8. Thus, this study substantiates the prospect of targeting mLST8 protein using potent hits which could hinder tumor progression in colon and prostate cancers.



Protective effect of the combination of *Halophila beccarii* and *Camellia Sinensis* aqueous extracts on oxidative - mediated nephrotoxicity induced by alcohol

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An experimental analysis was carried out to investigate the synergistic effect of *Halophila beccarii* and *Camellia Sinensis* aqueous extracts against alcohol induced nephrotoxicity. Forty albino rats were assigned into seven(7) experimental groups with six rats in each group. Group I(Normal control) was administered normal saline only. Group II(standard control) was administered 5mg/kg body weight of standard drug (Silymarin); group II I (Normal treated) with 500 mg/kg bwt mixed extract preparation (MEP) was administered; Group IV (alcohol treated) 5ml/kg body weight of 10% ethanol while rats in Groups V, VI(test groups) was administered with the aqueous extract of *Halophila beccarii* (AEHB) and *Camellina Sinensis* (AECS) each at dose of 500 mg/kg body weights and Group VII (test group) was administered with dose of 250 mg/kg body weights of aqueous extract of *Halophila beccarii* and 250 mg/kg body weight of *Camellina Sinensis* as mixed extract preparation (MEP) respectively. Rats in standard control and test groups were administered 5ml/kg body weight of 10% ethanol, once a day, 3 hours after administration of standard drug and aqueous extract of *Halophila beccarii* and *Camellina Sinensis* respectively. The administration lasted for 16 days through oral intubation. The result of our investigation showed that creatinine, uric acid, urea, urea nitrogen, ALP and proteins were significantly ($P<0.05$) increased in positive control group compared to the levels observed in the normal and standard control groups. However, groups administered with mixed extract of AEHB and AECS at the doses of 500 mg/kg body weight all showed a significant ($P<0.05$) reversal in the trends of these parameters to concentrations comparable to those observed in the positive and normal control groups. The findings of this study suggest that mixed extract preparation of *Halophila beccarii* and *Camellina sinensis* aqueous extract significantly may have potentials that could be exploited for development of therapy against renal toxicity.



**Targeting Colon Cancer Stem Cells by Dietary Bioactive Compounds in
the Prevention of Colon Carcinogenesis**

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Colorectal cancer (CRC) is one of the most commonly diagnosed cancers in both men and women, posing a serious demographic and economic burden worldwide. Globally colon cancer strikes more than one million people annually and is responsible for more than half a million cancer deaths. Recent studies shows that the majority of malignancies, including colon cancer are driven by cancer stem cells (CSCs) that are resistant to current chemotherapeutic drugs leading to cancer relapse. Wnt signaling plays a critical role in colon stem cell (SC) renewal and carcinogenesis. Diet contributes to 20-42% of all human cancers and 50-90% of colon cancer. Recent evidence shows that Western diet has a causative link to colon cancer; however, mechanisms of action are not fully elucidated. Western diet-induced obesity elevates IGF-1 and insulin levels, which could lead to elevated proliferation and suppressed apoptosis of CSCs through Wnt pathway. Although conventional chemotherapy targets the signaling pathways and can significantly reduce tumor size, but fails to eliminate CSCs and has serious side effects. Dietary bioactive compounds such as curcumin, lycopene, etc have promising chemopreventive effects, without serious side effects on cancers due to their direct and indirect actions on CSC self-renewal pathways such as the Wnt pathway. Understanding the role of CSCs in diet-induced colon cancer will aid in development of evidence-based dietary chemopreventive strategies and/or therapeutic agents targeting CSCs.



E-Poster Presentations

EPP 1

Effect of Melatonin and photoperiod on surfactant protein D in lung of albino rat

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Surfactant is a lipoprotein complex which besides many other functions also assists in providing immunity to the lung. Melatonin hormone which is also known as night hormone acts as immnoenhancer. For checking the measurement of surfactant protein D albino rats were treated with melatonin along with long light duration. Lungs were excised out and comparison were done with control group by applying different techniques and parameters indicated surfactant protein D level was quite differ in experimental rats lung as compared with control one.

Keywords: Melatonin; photoperiod; immunity; surfactant; parameter

EPP 2

Aptamers – An overview and its application

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Aptamers are those molecules which bind with a specific target molecule. Mainly aptamers are oligonucleotide or peptide. Among oligonucleotides the classifications are - DNA or RNA or XNA aptamers; and for peptide aptamers, the peptide domain can be variable. Aptamers are evolved by SELEX (Systematic Evolution of Ligands by Exponential Enrichment) method. There several applications of aptamers in medical science, research field, agriculture, etc. Nucleic acid aptamers are very much use of cost in the application of medical science. The additional benefits of Nucleic acid aptamers are its very much low toxicity, low immunogenicity, high chemical flexibility. We can develop aptamers for therapeutic use, for example - auto-immune diseases, cancer, blood clotting, age-related macular degeneracy disease, etc. Aptamer also used in the hot start of PCR reaction that is in the initial phase of the reaction.

Keywords: SELEX, DNA, Oligonucleotide, Blood clotting, PCR

Investigation of the efficacy of *Ficus sycomorus* leaf extract for control of the major malaria vector *Anopheles coluzzii* larvae

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Insecticides resistance is a growing problem in the control of mosquito species that serve as vectors in the spread of malaria. In Nigerian rural communities, people use plants in controlling the mosquitoes which is a vector of malaria. *Ficus sycomorus* in combination with other plants are used to wade off mosquitoes. The aim of this research is to preliminarily, characterize the phytochemicals and the major malarial vector (*Anopheles gambiae*) larval control potential of *Ficus sycomorus* leaves methanolic extract. The active secondary metabolites from methanol extract of *Ficus sycomorus* leaves were analyzed and characterized using gas chromatography - mass spectrometry (GC-MS). The larvicidal potential of the extract phyto-components was also determined. A modified WHO standard protocol for larvicidal bioassay was used to determine the larvicidal activity of the *Ficus sycomorus* methanol extract. Molecular species identification showed that 75% of the larvae were *Anopheles coluzzii*; 6.25% *Anopheles arabiensis* and 12.5% *Anopheles gambiae*. The extract reduced the survival of *An. coluzzii* larvae by approximately 60% at LC₅₀ 0.225mg/ml and the mortality was dose dependent. Phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, saponins, terpenoids, phytosterols and phenols, with alkaloid and flavonoids had highest concentration. The GC-MS was employed to identify the potent constituent present in active fraction of *Ficus sycomorus* as Tetrapentacontane 66.6%; Sigmastrol 2.81%; Squalene 1.01; Bis(2-ethylhexyl) phthalate 4.04%; 4,8,12,16-Tetramethylheptadecan-4-olide 0.51% and other alkanes. The larvicidal efficacy of the extract as seen from this study can be attributed to different phytochemicals and other undetected compounds probably working individually, synergistically or additively. Overall, the *F. sycomorus* leaf extract is promising source of larvicides against malarial vectors with moderate toxicity. It is therefore; recommend using this extract as an integrated insect management program which can greatly reduce the use of synthetic insecticides and has a potential as an ideal eco-friendly agent for control of mosquito vectors.

Key words: *Anopheles gambiae*, Botanicals, *Ficus sycomorus*, FTIR, GC-MS, Insecticide resistance, RSM



Preliminary phytochemical screening of different solvent mediated extracts and antimicrobial activity of genus *Momordica* L. of family Cucurbitaceae from Northern India

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Medicinal and aromatic plants are potential source of raw materials used for manufacture of drugs and perfumery products more than a quarter of all the medicines used in the world today contain natural compounds derived from plants that often serve lead molecules whose activities can be enhanced by manipulation through combinations with chemicals and by synthetic chemistry that can be exploited in the field of new drugs research and development. Phyto constituents are the natural bioactive compounds found in plants. This phyto constituents work with nutrients and fibers to form an integrated part of defense system against various diseases and stress conditions. Prevention of food spoilage and food poisoning pathogens is usually achieved by use of chemical preservatives which have negative impacts including: human health hazards of the chemical applications, chemical residues in food & feed chains and acquisition of microbial resistance to the used chemicals. Because of such concerns, the necessity to find potentially effective, healthy safer and natural alternative preservatives is increased. Within these texts, Plant extracts have been used to control food poisoning diseases and preserve foodstuff. Antimicrobial activity of five plant extracts were investigated against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* using disc diffusion technique. Methanolic extracts showed potential antimicrobial activity. These plant extracts which proved to be potentially effective can be used as natural alternative preventives to control food poisoning diseases and preserve food stuff avoiding healthy hazards of chemically antimicrobial agent applications.



Effect of natural preservatives (lemon grass and bay leaf marinade) on the microbial load and shelf life of smoke-dried *clarias gariepinus*

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This study was carried out to determine the effect of lemon grass marinade (A), bay leaf marinade (B) and a combination of both spices (C) on the microbial load of stored smoked-dried *Clarias gariepinus*. Comparative analysis of the microbial load of each treated fish samples during ambient storage was done biweekly for six weeks and then samples of each treatment were taken to the laboratory periodically. The fish samples were analyzed using Potato Dextrose Agar and Nutrient Agar for fungi and bacteria respectively. The initial microbial load before storage showed that the highest number of bacteria counts occurred in the sample treated with bay leaf marinade (4.7×10^3) while the lowest was in the sample treated with lemon grass marinade (1.3×10^3). The highest fungi count was observed in the sample treated with the combination of both spices (9.5×10^2) while the least fungi count was in fresh fish sample (1.4×10^3), although the fresh fish sample had the highest bacteria mean count (5.1×10^3) when compared with the treated samples. After 6 weeks of ambient storage, the result of the treated sample with spices B was also significantly different from the mean population of treated sample with spices A and that treated with spices C. Treated sample with spices B again had the highest bacteria and fungi mean count of 1.7×10^5 and 2.3×10^4 respectively. Treated sample with spice A and treated sample with spice C had similar bacteria mean count of 1.5×10^5 while treated sample with spice A had the lowest fungi mean count of 1.6×10^4 . The study revealed that all three smokeddried fish sample treatment had a relatively low bacterial and fungal count below the 5×10^5 cfu/g recommended by the International Commission of Microbial Specification for Food and Food Products (ICMS, 2002).

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Tylophora indica in treatment of bronchial asthma

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Bronchial Asthma is a disease of lungs in which the patient complaining of recurrent attacks of breathlessness and wheezing due to the narrowing of the airways of the lungs. The causes of asthma may be genetic but the disease develops and persists as a result of changes in the environment, food and life styles. It is believed that attacks were triggered by allergens. Tylophora indica more simply known as the asthma plant is nature gift for the long suffering asthmatics. It is called Antmul in Sanskrit and Verripala in Telugu. The leaves, stem and roots of the plant contain 0.2-0.3% alkaloid called Tylophorine (Hooper, 1891). The emetic properties of the root and leaf were well established. Ayurveda acknowledges “Vamana” as useful in ejecting the afflicted Kapha (Phlegm). The method of “Vamana” is very popular in ayurveda treatment of asthma. Tylophora is very effective in drawing out the scum of kapha from the bronchial tubes resulting in the oxygenation of blood and relieving symptoms of asthma and providing solace to the patient. The mode of treatment, diet regimen was discussed.



Immunomodulators - primer of our daily routine

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Immunomodulators has become a trendy natural therapies in our present pandemic circumstances which are the drugs that modulate the immune response of body . Immunity help us to cure many dreadful diseases and protect from infections , immuno modulators like circumin “rhizome of circuma longa”, genisten , resveratol, nyctanthes abortrist ,which controls the antifungal diseases, chronic infections, reduces nephrotoxicity, and diabetogenic diseases. They will acts as adjuvants and stimulates both specific and non specific immune response. They are divided into three types immuno suppressants immune tolerance and immunostimulants. This immunomodulators acts as toxic agents to dreadful diseases, helps to balance dietary supplements. Immune modulating therapies alter the way that the immune system works. Because sarcoidosis is associated with an overreaction of the immune system, suppressing part or all of the immune response can help manage symptoms and prevent permanent damage. They act as booster doses to several vaccines, as in a recent technology immunomodulators are developing as a reducing agents of HIV.

Keywords : Immuneresponse, Suppresants, Stimulants, Diabertagenic, Trendy Drugs, Dreadful Diseases, Dietarysupplemant.

Evaluation of Hepatoprotective Activity of (-)-Epicatechin Against D-Galactosamine-Induced Hepatotoxicity in Albino rats

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Background: The liver performs various functions that are vital for life. In the absence of reliable hepatoprotective drugs, a large number of plant based therapeutic agents are used for the treatment of liver diseases. Therefore the present study aims to investigate the hepatoprotective effects of (-)-epicatechin (flavonol) against D-Galactosamine hydrochloride (D-GalN)-induced liver damage.

Methods: Rats were divided into 5 groups of 6 animals each. Group I served as the normal healthy control, groups II rats were (-)-epicatechin positive control (50 mg/kg daily), group III rats were intoxicated with single injection of D-GalNi.p. (800 mg/kg body weight), group IV rats received D-GalNi.p. and (-)-epicatechin orally (50 mg/kg b/w) and group V rats received D-GalNi.p. and Silymarin orally (100 mg/kg b/w) for 21 days. The hepatoprotective potential of (-)-epicatechin in rats was evaluated by measuring the gene expression levels of three inflammatory biomarkers; Tumor necrosis factor-alpha (TNF- α), Transforming growth factor-beta (TGF- β) and Interleukin-6 (IL-6) in addition to other liver biomarkers. Histopathological changes in the liver were assessed using hematoxylin and eosin staining (HE).

Results: The administration of (-)-epicatechin showed hepatic protection at an oral dose of 50 mg/kg b.w. (-)-epicatechin significantly reduced the elevated serum levels of intracellular liver enzymes as well as liver biomarkers in comparison to D-GalN- intoxicated group. Notably, (-)-epicatechin significantly reduced the expression levels of TNF- α , TGF- β and IL-6 compared to their levels in D-GalN intoxicated group. These findings were confirmed with the histopathological observations, where (-)-epicatechin was capable of reversing the toxic effects of D-GalN on liver cells compared to that observed in D-GalN-intoxicated animals.

Conclusion: Our results show that (-)-epicatechin has potential hepatoprotective effects at 50 mg/kg body weight. These effects can be regarded to the antioxidant and anti-inflammatory properties of the bioactive compound. *Key words:* (-)-Epicatechin, Inflammatory markers, D-GalN, Antioxidants, Liver biomarkers.



Biotechnological production of α -amylase by solid substrate fermentation

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Amylase (E.C.3.2.1.1-1, 4-alpha D-glucano hydrolase) is an extracellular enzyme, which is used in starch processing industries as it breaks starch into simple sugar constituents. Amylase potential applications include starch processing, brewing and sugar production, in textile industries, detergent manufacturing, food and agricultural industries. Interestingly, the first enzyme produced industrially was an amylase. In the current study, amylase producing bacteria were isolated from rice field, sugarcane field and sugarcane dump area and characterized for their morphological and biochemical properties. Then amylase activity of isolated bacterial cultures were determined and it was concluded that 1 (NN5) out of bacterial colonies (NN1, NN2, NN3, NN4, NN5) were potent and their enzyme activity was more than other colonies. The NN5 isolate shows highest specific activity at day 2 incubation at 60°C and pH 7.0 after 30 min incubation with 1% starch in 0.05 M PBS buffer was chosen for further analysis. The potent colonies were also optimized for enzyme activity under certain conditions like different Agro-industrial wastes. These were used as substrate for amylase production by Solid-State Fermentation SSF. The present study, observed that wheat bran was the suitable substrate for amylase production.

Key words: Amylase, solid state fermentation, agro- industrial wastes

Proximate Composition and Phytochemical Screening of *Ipomea asarifolia* leaf meal (IALM) in Semi-Arid Zone of Nigeria

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This research was carried out to determine the Proximate and Phytochemical Screening of *Ipomea asarifolia* leaf meal. The leaf was collected from the premises of Kano University of Science and Technology Wudil. The leaf was dried in a well-ventilated are, and the sample were taken to laboratory for analysis. From the results, it can be seen that IALM was rich is crude protein (15.58%), ether extract (0.75%), dry matter (94.99%), crude fibre (14.22%), ash (5.01%), and metabolizable energy of 1275.670 Kcal/kg. The results show the presence of various phytochemical constituents in the extract of *Ipomea asarifolia* leaf meal. It was reported with oxalate (3.60 mg/g), phytate (2.21%), tannin (0.014%), saponin (4.90%), flavonoid (3.25%), alkaloid (2.78%), and total phenolic with 15.75 mg GAE/100 g, respectively.

Keywords: *Ipomea asarifolia*, Semi-Arid, Phytochemical, Proximate



Genomics Application in Conserving Biodiversity Species in Nigeria

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The vulnerability of present day conventional crop production systems towards pests, diseases and climate change makes the issues of genetic resources and biological diversity conservation very pertinent as well as urgent. Most species that were originally common in Nigeria are becoming rare. Plant genetic resources and biodiversity conservation in Nigeria with regards to the relevance of biotechnological approaches has been studied. Biotechnology has been recognized as a versatile tool for biodiversity conservation, management and use. It offers range of applications to improve the understanding and management of genetic resources for food and agriculture. Since biodiversity can occur at any level of classification, erosion can also happen at any level of classification. It has been proven that modern biotechnologies can help to counteract trends of genetic erosion in all food and agriculture sectors. Biotechnology procedures in conservation and management of Plant Genetic Resources have been reviewed. This study reveals that ex-situ biotechnological conservation strategies are effective for various plant species.

EPP 12

**ISOLATION AND ANTIOXIDANT ACTIVITY SCREENING OF A PEPTIDE
FROM *Bauhinia rufescens* (LAM. FAM.) SEED ON ALBINO MICE
CHALLENGED WITH SNAKE VENOM PHOSPHOLIPASE A2**

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Snakebite envenoming affects as many as 2.7 million people every year. However, several studies have been reported on active peptides from medicinal plants, which are safe and effective against snake venom induced toxicities. Hence, this research work was aimed at isolating and Antioxidant activity screening of a plant peptide from *Bauhinia rufescens* seed on albino mice challenged with snake venom phospholipase A2. *Bauhinia rufescens* seed was selected based on the ethnobotanical survey conducted on Medicinal plants used for the treatment of snakebite envenomation. Peptide (BRS-P19) and VPLA₂ were isolated and purified. Albino mice of both sexes were used for the *in vivo* experiments. The results showed that, *Bauhinia rufescens* seed peptide with molecular weight of ~19kD (BRS-P19) was obtained. The percentage *in vitro* inhibitory effect of BRS-P19 and antivenin on VPLA₂ was determined to be $91.85 \pm 0.32\%$ and $73.17 \pm 0.50\%$ respectively. For the *in vivo* study, the animals treated with 0.4 mg/kg b.w. BRS-P19 showed a significant ($P < 0.05$) decrease in the level of mice hepatic and renal ROS and MDA to 0.16 ± 0.02 mmol/g and 0.05 ± 0.01 mmol/g for ROS and 1.17 ± 0.07 mmol/g and 1.09 ± 0.04 mmol/g for MDA respectively, when compared to the VPLA₂ untreated group with 3.84 ± 0.20 mmol/g and 3.06 ± 0.08 mmol/g for ROS and 6.91 ± 0.18 mmol/g and 6.01 ± 0.14 mmol/g for MDA respectively. The activities of the mice hepatic and renal SOD, CAT and GPx were significantly ($P < 0.05$) increased to 55.73 ± 0.57 U/g and 48.39 ± 1.80 U/g for SOD, 37.06 ± 0.24 U/g and 30.54 ± 0.64 U/g for CAT and 145.12 ± 1.07 U/g and 125.11 ± 0.20 U/g for GPx respectively by BRS-P19 (0.4 mg/kg), as compared to the VPLA₂ untreated group with 11.13 ± 0.11 U/g and 7.12 ± 0.02 U/g for SOD, 6.23 ± 0.10 U/g and 9.50 ± 0.50 U/g for CAT and 23.02 ± 0.32 and 31.09 ± 1.87 U/g for GPx respectively. Based on these results, it has been established that, BRS-P19 has inhibitory effect on the VPLA₂ activity and presents antioxidant activity as the possible mechanism of action against VPLA₂ induced free radicals formation.

Keywords: *Bauhinia rufescens*, Peptide, Snake Venom, Phospholipase A2, Antioxidant, Reactive Oxygen Species.



Evaluation of Dietary Inclusion of Medicinal Plants (Ginger and Turmeric) Blend on Haematological and Biochemical Indices of Laying Chicken

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This study was carried out to evaluate haematological and biochemical indices of laying chicken fed diets supplemented with ginger and turmeric at different inclusion level. One hundred and sixty (160) birds of Isa brown strain at twenty six (26) age were used. They were allotted into four dietary treatment groups having 4 replicates per treatment with 10 birds per replicate. The basal diet was fed singly to birds on control group while three other groups were fed basal diet supplemented with 2% ginger, 2% turmeric and 1% ginger + 1% turmeric respectively. Data were collected on blood parameters and subjected to one-way analysis of variance (ANOVA). The results showed that medicinal plants blend supplementation had significant ($p < 0.05$) effect on haematological (red blood cell, white blood cell, lymphocytes and eosinophiles) and serum (total protein, serum albumin and serum globulin) parameters at 10 weeks in lay. However, medicinal plants blend supplementation had no significant ($p > 0.05$) on haematological parameters at 20 weeks in lay. At 10 weeks in lay, red blood cell ($2.33 \times 10^{12}/L$) value was highest ($p < 0.05$) in birds fed 1% ginger + 1% turmeric while white blood cell ($7.08 \times 10^5/L$) was highest in birds fed control diet without medicinal plants blend. Total protein (12.33 g/dl), serum albumin (6.33 g/dl) and serum globulin (6.00 g/dl) values were also highest ($p < 0.05$) in birds fed 1% ginger + 1% turmeric and lowest in birds fed 2% turmeric at 10 weeks in lay. This study concluded that at 10 weeks in lay, supplementation of layers diet with medicinal plants blend had significant effect on some haematological (red blood cell, white blood cell, lymphocytes, eosinophiles) and serum (total protein, serum albumin, serum globulin and creatinine) parameters of laying chickens. While at 20 weeks in lay, no significant effect was observed.



**Extraction, Isolation and Characterization of Bioactive Compounds from
Plant Extract**

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Natural products from medicinal plants, either as pure compounds or as standardized extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. Due to an increasing demand for chemical diversity in screening programs, seeking therapeutic drugs from natural products, interest particularly in edible plants has grown throughout the world. Botanicals and herbal preparations for medicinal usage contain various types of bioactive compounds. The focus of this paper is on the analytical methodologies, which include the extraction, isolation and characterization of active ingredients in botanicals and herbal preparations. The common problems and key challenges in the extraction, isolation and characterization of active ingredients in botanicals and herbal preparations are discussed. As extraction is the most important step in the analysis of constituents present in botanicals and herbal preparations, the strengths and weaknesses of different extraction techniques are discussed. The analysis of bioactive compounds present in the plant extracts involving the applications of common phytochemical screening assays, chromatographic techniques such as HPLC and, TLC as well as non-chromatographic techniques such as immunoassay and Fourier Transform Infra-Red (FTIR) is discussed.

Keywords: Bioactive compound, Plant Extraction, Isolation, Herbal preparations, Natural products



**Refinery effluent Scope of seaweed culture in India for sustainable food
and industrial applications**

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Apart from agriculture, Fisheries sector plays a vital role in Indian economy through sustainable forex earnings, employment generation and ensuring nutritional and food security. Unlike agriculture and Aquaculture, the seaweed culture / Seaweeds farming which is commonly called as Algae culture is not up to the standards. There is a need to put immense work on culturing these sea products as it has very limited importance on Indian subcontinent. So, there is a need to raise up these sources thus utilizing the treasures of sea, creating food security, ensuring the healthy population by providing employment and generating the economy. There about 844 seaweed species that are documented from India with a coast line of 5200km from Gujarat all the way to west Bengal which is bountiful for raising sea weeds. Seaweeds are important resource for humans and is harvested for food, medicinal purposes and its uses in various products. There are some species like ulva, pytopia, porphyra and Kappaphycus are edible and that it will be good to culture them in large scales. Just because something is nutritious it won't be accepted. Especially in India people prefer the test and spicy sensation more than nutritional aspects. Best of all they are vegetarian indeed vegan and do not have any fishy smell thus good and acceptable for large population of the peoples. present uses of seaweeds at present in India are as cosmetics, fertilizers and for the extraction of industrial gums and chemicals. In its simplest form it consists of the management of naturally found batches. It will be a global force to eradicate the crisis of unemployment, malnutrition etc.

Keywords: The project was based on theme of Sustainable development; this project was framed by satisfying max 3 of them. As we know that there are 17 sustainable development this project includes the following SDG's such as NO POVERTY GOOD HELATH AND WELL BEING and ZERO HUNGER...



The origin, Transmission and Pathogenesis of COVID-19: Suggesting a Better Containment Approach of the Pandemic in Nigeria

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Following the outbreak of Severe Acute Respiratory Syndrome Corona Viruses (SARS-CoV) in 2002, and Middle East Respiratory Syndrome Corona Viruses (MERS-CoV) in 2012, the present outbreak, caused by SARS-CoV-2 is regarded as the third introduction of a highly pathogenic virus strain into the human population. The point of concern is that, despite the hundreds of thousands of lives it has claimed, and the subsequent interventions by health authorities worldwide, it continues to pose a severe threat, to the global health and economy, as countries are battling to adjust to the present damages caused. Nigeria isn't left out, among the countries massively hit, as a number of economic activities are yet to resume fully. Coronavirus disease 2019 (COVID-19) is an infection caused by the novel SARS-CoV-2. The disease is highly transmittable and spreads via droplets from an infected patients or incubation carriers with or without clinical symptoms. SARS-CoV-2 was first identified in the city of Wuhan, Hubei Province China in December 2019, and studies have possibly related it to a seafood market in China. Bats as the primary reservoirs have been known to harbour more coronaviruses than any other species. They play an important role as the gene source in the evolution of these viruses. For many decades' numerous studies in Africa, America, Asia and Europe have discovered the existence of novel coronaviruses in a number of bat species, and 7 out of the 15 currently assigned species within the genera (α -CoV), and (β -CoV), which mainly infect mammals, have only been found in bats. To-date, the molecular pathogenesis of COVID-19 is poorly understood. However, MERS-CoV and SARS-CoV mechanisms can shed light, as studies have shown similarities in the structure of both SARS-CoV-2 and SARS-CoV glycoprotein spikes with few



structural differences in the Receptor-Binding Domain (RBD). After infecting human cells, the Disorders caused by SARS-CoV-2 includes both respiratory and systemic disorders. The absence of an effective treatment or a vaccine combined with an exponential growth in infections, led many countries to implement a number of interventions to reduce the high transmission rate. This review is an attempt made in the respect of highlighting some important information regarding the origin, transmission and pathogenesis of covid-19, thereby suggesting additional and a better containment approach of the pandemic in Nigeria.

Keywords: Coronavirus pandemic, COVID-19, SARS-CoV-2, α -CoV, β -CoV, δ - CoV, γ -CoV, Receptor-Binding Domain, glycoprotein spikes, and Nigeria.

EPP 17

Current drugs on HIV

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HIV-1 protease, a homodimer, has attracted the interest of many researchers due to its essential role in HIV replication and subsequent functional activities. It hydrolyses different viral proteins into their functional form to help in maturing the virus for further extending the disease propagation. The present workflow in this research was designed to identify potential HIV-1 protease inhibitors from library of approved drugs (1,428 compounds) using computational techniques in Computer-Aided-Drug-Design (CADD). The inhibitory potency of the dataset was evaluated using the lowest theoretical binding energies of the target-ligand complex. Software and tools such as Molecular Operating Environment (MOE), AutoDock Vina, Discovery Studio used in CADD were employed during the process of this work. This study suggests the possibility of repurposing some current drugs (from the library) to having potential HIV Protease inhibitory effect.



***Jatropha curcus* a treasure of medicine against infections**

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This study investigated the use of *Jatropha curcus* as a medicinal plant used in treating many microbial infections. The lack of scientific standardization as well as possible therapeutic alternatives against antibiotic resistant bacterial and fungal infections indicates strong need for continuous effort to validate the use of plant material as alternative therapy regimens with similar or higher antibiotic beneficial properties. The present study describes the phytochemical activities and antibiotic properties of *Jatropha curcus* extracts against *S. aureus*, *E. coli*, *Klebsiella*, *Shigella* sp, *Candida albicans*, *C. glabrata*, *C. krusei*, *C. tropicalis* and *C. kfyer*. The phytochemical analysis was carried out using hexane, ethyl acetate and methanolic extracts of root bark of the plant using standard methods. The antibacterial potency was initially determined by agar well diffusion method for crude extracts of *Jatropha curcus* followed by quantitative evaluation of antibacterial activity by Minimum inhibitory concentration and Minimum bactericidal/fungicidal concentration. Phytochemical screening of all the extracts revealed the presence of alkaloid, flavonoids, carbohydrate, triterpenes and tannins. Steroid was absent in hexane and ethyl acetate but present in methanol extract. Anthraquinones was absent in all the extracts. Sensitivity test result showed that all the test isolates were sensitive to hexane, ethyl acetate and methanolic extracts at 500mg/ml. *Staphylococcus aureus*, *Shigella* sp., *Candida krusei* were found to have Minimum Inhibitory and Minimum Bactericidal/Minimum Fungicidal Concentrations of 31.25mg/ml and 62.5mg/ml respectively in all the extracts. Thus this plant is a potential candidate for drug development for the treatment of diseases caused by these pathogens.

Keywords: *Jatropha curcus*, phytochemical analysis, Minimum inhibitory and Minimum bactericidal/fungicidal concentration



EPP 19

**ISOLATION AND CHARACTERIZATION OF BACTERIAL ISOLATED FROM
POLLUTED SOIL FROM MECHANIC WORKSHOPS AROUND ABEOKUTA
METROPOLIS**

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Soil provides a habitat for microorganisms, and is the most bio-diverse and rich environment on Earth that supports their existence. Soil microorganisms play a very significant role in the environmental ecosystem. Although, the contamination such as polycyclic aromatic hydrocarbons, heavy metals represents one of the most pressing threats to water and soil resources. The petroleum pollutant entered into soil influence plant growth and causes human health concern.

This research work was carried out to determine the effect of contaminants such as heavy metals and petroleum on molecular microbial habitat in the soil from three different locations in Abeokuta Metropolis. Adequate laboratory procedures were used to ensure that the microorganisms were extracted in aseptic conditions. Various techniques were used in the adequate extraction of microbial samples from the soil before the use of DNA extraction and PCR amplification techniques was used in extracting, purifying, washing, elution and storage of DNA the samples.

The result shows that the microorganisms present in the soil sample contaminated were majorly Bacteria which includes *Pseudomonas alcaligenes* strain, *Pseudomonas aeruginosa* strain, *pseudomonas putida* strain and *Bacillus subtilis* strain. All of which their genetic sequencing was carried out and illustrated after the DNA extraction.

Characterization and Antidiabetic Activity of Aqueous Extract of Whole White Grub and Waste in Alloxan Induced Diabetic Rats

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Diabetes mellitus is a metabolic disorder characterized by a loss of glucose homeostasis resulting from defects in insulin secretion, action or both, resulting in impaired glucose, lipids and proteins metabolism. The aim of this study is to investigate the effect of administration of aqueous White Grub and Waste extract on alloxan-induced diabetic rats. Diabetes was induced in rats after 72 hours of fasting intraperitoneally by alloxan (100 mg/kg). A total of 30 rats used, the rats were divided into five groups (GA-GE) of six rats each. GB - GE were induced with diabetes. GA served as normal control, GB were administered only distilled water and GC were administered the standard anti-diabetic drug Glibenclamide '5 mg/kg'. While GD (WGE, 100 mg/kg), GE (WE, 100mg/kg) were respectively administered. After eighteen (18) days of oral administration of the extracts, the animals were sacrificed and the serum was collected for analysis of lipid profile (Total Cholesterol 'TC', Low Density Lipoprotein-Cholesterol 'LDL-C', High Density Lipoprotein-Cholesterol 'HDL-C', Very Low Density Lipoprotein 'VLDL' and Triglycerides 'TG'). In the first week treatment the extract treated group showed elevated level of TC, TAG, LDL, HDL (WGE), VLDL (WE) and significant decreased ($p < 0.05$) VLDL (WGE) and HDL (WE) while in the second week treatment the WG extract treated group showed significant decreased ($P < 0.05$) serum level of TC, TAG, LDL cholesterol, VLDL and HDL cholesterol normalized significantly while increased levels of TC, TAG, VLDL, LDL, and decreased HDL cholesterol were observed in WE treated group compared to diabetic untreated control group. WGE shows similar effect compared to the reference drug as the blood glucose levels return to normal after 18 days of oral administration. Percentage increase and decreased blood glucose (BG) levels and lipid profile were evaluated for 18 days of oral administration of the extracts. The Fourier Transform Infrared (FTIR) analysis of the most active extract shows that the compounds may contain the functional groups like -CO, Nitro, -COOH, an aromatic ring, and others, while its Gas chromatography-Mass spectroscopy (GC-MS) analysis may contain Carbonic acid, Fatty acids, carbohydrate and others. This result shows a positive effect of the Whole White Grub extracts in the management of Diabetes mellitus (DM) and lipid abnormalities may be associated with the presence of the compounds and functional groups.

EPP 21

Isolation of Phyto-Peptide from *Bauhinia rufescens* (LAM. FAM.) Seed and its Potential Inhibition of Oxidative Organ Damage in Envenomed Albino Rats

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Background: Interest in bioactive peptides has considerably increased in the last decade. Apart from the better characterized glycoproteins from snakes and mammals, which exhibit inhibitory properties against snake venoms toxins and their toxic properties, there are some reports on newly described peptides isolated from medicinal plants that are active against snakebite envenomation.

Aim: This research was aimed at isolating a phyto-peptide from *Bauhinia rufescens* seed and screens its potential inhibitory effect on oxidative organ damage in envenomed albino rats.

Materials and Methods: *Bauhinia rufescens* seed was collected within Aliero town, Kebbi State, Nigeria. It was duly identified, authenticated and processed. The peptide was isolated from the seed and partially purified using ammonium sulphate precipitation. *Naja nigricollis* venom was purchased, prepared and used for the experiments. Albino rats of both sexes were used for the in vivo experiments. They were divided into five (5) groups of three (3) rats each. Group 1 served as normal control, group 2 were injected with venom only, group 3 and 4 were injected with venom followed by administration of the peptide at the doses of 0.2 and 0.4 mg/kg body weight respectively, while, group 5 served as standard control. In all the groups, hepatic and renal levels of reactive oxygen species (ROS) and lipid peroxidation were determined.

Results: The protein content after ammonium sulphate precipitation was estimated to be 1.42 mg/ml. The percentage in vitro inhibitory effect of the isolated peptide on venom phospholipase A2 was determined to be 79.99% where the standard antivenin presented 75.45% inhibition. For the in vivo study, the animals treated with 0.4 mg/kg b.w. showed a significant ($P < 0.05$) decrease in the level of hepatic and renal lipid peroxidation (MDA level) (13.8 ± 1.45 mmol/g and 8.3 ± 1.81 mmol/g respectively) compared to the untreated group with 42.2 ± 1.08 mmol/g and 10.8 ± 0.47 mmol/g respectively. The level of the MDA in this treated group was not significantly different ($P > 0.05$) when compared to those treated with the standard antivenin (8.6 ± 1.65 mmol/g and 7.3 ± 2.75 mmol/g respectively).



Conclusion: Based on these findings, it has been established that the isolated peptide has the potential inhibitory effect against *N. nigricollis* venom induced free radical formation thereby preventing the oxidative hepatic and renal damage.

Keywords: *Bauhinia rufescens*, Phyto-peptide, *Naja nigricollis* Venom, Reactive Oxygen Species, Lipid peroxidation.

EPP 22

Integrated solar drying retains more nutrients in foods

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Aims: to determine the effect of solar and ambient drying methods on the proximate composition of tomato, pepper and carrot.

Methodology: fresh vegetables of tomato, pepper and carrot were washed, sliced to 4 mm thickness, pre-treated with 3 % sodium metabisulphite solution, dried (solar & ambient) in two seasons and analysed for proximate composition by method of AOAC, 2010. A locally fabricated integrated solar dryer designed at National Center for Energy Research and Development, University of Nigeria, Nsukka was used for solar drying while ambient drying was carried out under sun. Proximate analysis was evaluated on the vegetable samples after drying in two seasons, dry (4 days) and rainy (5 days).

Results: Proximate composition values varied significantly ($p < 0.05$) between solar dried and ambient dried samples and between dry and rainy season drying regime. The values of moisture content, fat and crude protein content of solar dried samples were lower than ambient dried samples in both season in all samples, while ash and crude fiber content were higher in solar dried samples than in ambient dried ones in all samples.

Conclusion: This study showed that integrated solar drying retained more of the nutrients than ambient drying and could be a better drying method.

EPP 23

Nanotechnology innovations highly effective against cancer in vivo and in vitro

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Cancer is one of the most challenging diseases today, the death rate of cancer is increasing day by day. At present, about 1 billion people die from cancer every year. Nanotechnology or nano-medicine can be a promising approach to combat cancer. Nanotechnology is a multidisciplinary field that is associated with engineering, medicine & human physiology. This technology includes nanorobot, nanomedicine, nanospheres, nanovesicles, nanoemulsions can be used against tumor detecting as well as cancer-detecting. Some of these technologies enable the link of diagnostics with therapeutics which can be significant for the personalized administration of cancer. These can boost up other traditional therapies such as chemotherapy, immunotherapy & target therapy. In this poster, some recent nanotechnology innovations are revealed which are highly effective against cancer in vivo as well as the in-vitro process.

EPP 24

QUALITY ASSESSMENT OF WINE PRODUCED FROM PLANTAIN (*Musa paradisiaca*. L)

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In a bid to achieve food security through the reduction of food waste and losses, this study was carried out to determine the potential of plantain (*Musa paradisiaca*. L) fruits for the production of wine. The physiochemical properties (Specific gravity, pH, titrable acidity, alcohol content) of the wine produced from plantain fruit was evaluated. A decrease was observed in the specific gravity and pH of the wine produced. The decrease in both pH and specific gravity was followed by a significant increase in the alcohol. In conclusion, plantain fruit serves as a suitable raw material for wine production. The outcome of the study was intended to expand the utility of plantain (*Musa paradisiaca*. L) so as to reduce seasonal losses of the fruits and serve as a substitute for imported wines in Nigeria.

Keywords: controlled fermentation, alcoholic content, plantain, *saccharomyces cerevisiae*



EPP 25

Understanding of Cancer with Nanotechnology

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Cancer is one of the most challenging diseases today, the death rate of cancer is increasing day by day. At present, about one billion people die from cancer every year. Nanotechnology or nano-medicine can be a promising approach to combat cancer. Nanotechnology is a multidisciplinary field that is associated with engineering, medicine & human physiology. This technology includes nanorobot, nanomedicine, nanospheres, nanovesicles, nanoemulsions can be used against tumor detecting as well as cancer-detecting. Some of these technologies enable the link of diagnostics with therapeutics which can be significant for the personalized administration of cancer. These can boost up other traditional therapies such as chemotherapy, immunotherapy & target therapy. In this poster, some recent nanotechnology innovations are revealed which are highly effective against cancer in vivo as well as the in-vitro process.

EPP 26

Heavy metals in drinking water

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Humans have been a great threat to the environment due to their various activities that results to the release of harmful substances into the environment. The sales and repairs of automobile parts, release of spent engine oil, painting, panel beating, sales of tires among other activities have contributed to the contamination of groundwater (wells) in Araromi automobile spare parts market, Ibadan with heavy metals and Polycyclic Aromatic Hydrocarbons (PAHs). Analyses was carried out on 500 ml of water samples from seven wells designated CWW 1-7 and distilled water control to determine the levels of heavy metals and PAHs in the contaminated well water, results obtained showed that CWW 1 had highest concentration of iron at $2.87 \pm 0.184 \text{ mg/L}$, which was significantly ($p < 0.05$) higher than the control. CWW 7 had the highest levels of Benzo (b) fluoranthene at $0.05 \pm 0.03 \mu\text{g/L}$, Benzo 1,2, anthracene at $0.42 \pm 0.3 \mu\text{g/L}$ and Pyrene at $0.30 \pm 0.22 \mu\text{g/L}$. 20 questionnaires were administered to respondents around each well, making a total of 140



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questionnaires in all. Results showed that CWW 1 and CWW 7 were used more often for cooking, drinking, washing bathing and ablution t. Ten mice were placed in each nine concentration groups and control designated CWW 1 25%, CWW 1 50%, CWW 1 75%, CWW 1 100%, CWW 7 25%, CWW 7 50%, CWW 7 75%, CWW 7 100% and the control group administered with distilled water. Weekly water consumption pattern was taken and recorded for each concentration groups; the means of each group and respective overall mean shows that the mice in the control group had significantly higher water consumption compared to the exposed group. Three mice were sacrificed from each group at days 21, 42 and 84 respectively. Body weights analysis shows that there were increase in body weight of the concentration groups with the exception of CWW 1 25% at 7.90%, CWW 1 100% at 5.30% and CWW 1 75% at -1.30% compared to the control at 10.40% all at day 21. Results gotten from absolute organ weights relative organ weights of right testes, left testes, right epididymis, left epididymis and seminal vesicle showed the decrease and increase in the organ weights at time interval showing effects of heavy metals and PAHs on male reproductive system. FSH level rises with the exception of CWW 7 50% at day 21, CWW 7 75% at day 42, CWW 7 50% at day 84 and LH decreases with the exception of CWW 1 25% and 100% at day 21 and CWW 7 50% and 100% at day 84. Changes such as intracellular space degeneration, retained elongated spermatids, testicular atrophy, basement thickening were found in testicular histology of mice exposed with these contaminated waters while the testicular histology of mice in control group appears normal.



BIOREMEDIATION OF CRUDE OIL CONTAMINATED SOIL USING BLENDED MIXTURES OF FISH AND PIGGERY WASTES AS BIO-STIMULATING AGENTS

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The present study investigated the potentials of two blended organic manures (Fish and pig wastes) as biostimulating agents in restoring induced crude oil pollution in soil samples. 200g soil sample was obtained from the demonstration farm of the Bioresources Development Center, Ubulu-Uku Delta state. 35g of the soil sample each was distributed into six different sample bottles and was labeled accordingly. 10% (w/w) of Bonny crude oil was used to contaminate each soil sample except the control soil sample. Similarly, 30g of the blended mixture of the organic manure (fish and pig wastes) were added to each of the soil samples and were analyzed for physicochemical properties, total Petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), heavy metals and endogenous oil degrading fungi populations on weekly basis for a period of eight (8) weeks. From the results obtained, bioremediation with the blended organic manure significantly improved the levels of nitrogen, P⁺, K⁺ and organic matters when compared with the control. The concentrations of PAH and TPH was significantly reduced following treatment with the organic remediants in a time dependent manner. The results also revealed that there was a significant increase (P<0.05) in the fungal load on the amended soil sample following the eight (8) treatment plan. Thus the study suggests that a combination of fish and pig wastes could serve as an excellent biostimulating agent for the remediation of crude oil polluted soils.

Keywords: Hydrocarbons, bioremediation, organic manure, pollution, crude oil



Bitter kola assisted the Igbo Speaking People in Nigeria against COVID-19

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The bitter kola (*Garcinia kola*) has been in use in Igbo land years immemorial for welcoming guests, treating stomach disturbances and source of flavour especially in cases of clearing mouth or mouth odour. The emergence of the Coronavirus Disease 2019 (COVID-19) increased the consumption of bitter kola alone and mixed with other plants in the Igbo land, South Eastern Nigeria. This review was carried out to see the possibility of bitter kola contributing to the management of COVID-19. Various analysis as revealed in literature has shown the constituents of bitter kola to include: alkaloids, saponins, tannins, flavonoids, glycosides, sterols, and phenols. Majorly are kolaviron, *Garcinia* biflavonoid (GB-1a-glucoside, GB-1a, GB-1, GB-2), kolaflavonone, benzophenone, xanthone, coumarin, apigenin, quercetin, and garcinoic acid. Others are hexadecanoic acid, 9-octadecanoic acid, methyl ester, linoleic acid, heptadecane-(8)-carbonic acid, formaldehyde, N, N-Diethyl, n-tetradecanoic acid amide; 3,4,8-trimethyl-2-nonenal, carbohydrates, vitamin C, potassium, phosphorus, ash, crude protein, crude fiber, crude lipid, water-soluble oxalate, terpenoids, and fat. The oil components are: meristic, pentadecanoic, margaric, trans-palmitoleic, cis-vaccenic, cis-oleic, cis-linoleic, α -linolenic, threonine, tyrosine, methionine, serine, histidine, and alanine. Most of the constituents have anti-viral properties of which COVID-19 could not be excluded. It is instructive as part of alternative medicine practise to research further on the role bitter kola is playing to curtail spread or manage the novel coronavirus disease in Igbo land and across the globe. Eating of bitter kola alone or together with other plants enriched with vitamin C could be of immense contribution to prophylaxis or management measures in coronavirus cases.

Keywords: Bitter kola, Vitamin C, COVID-19, Management.



Millet: Calcium and Phosphorus rich food source for bone building in infants

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Calcium is one of the chief mineral in human nutrition which occurs in the highest amount in the body. Millets are the rich sources of bone building calcium and phosphorous. Among them finger millet and pearl millet are rich in calcium. Millets are rich gluten free as it is also beneficial for lactose intolerance infants. In this study finger millet and pearl millet were selected for extracting the milk. Millets were cleaned, washed, soaked, sprouted, shade dried, grinded, and filtered/strained and finally millet milk was developed. The aim of the study is to develop millet milk which are helpful for growth and development of body, bone growth and development. The rats were divided into 2 groups the control and experimental. Control group rats were fed with cow's milk and the experimental rats were fed with millet milk. The mean weights of both the rats were gradually increased from first week till sixth week. The experiment was carried out for 45 days. According to the values there is no significant difference in the mean milk consumption and the physical parameters like initial weights, length, bone weight, bone length and the bone calcium levels.

GENETIC SCREENING OF SELECTED EXONS OF ASPM GENE INVOLVED IN MICROCEPHALY FAMILIES

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Microcephaly is a medical condition in which the brain does not develop properly resulting in a smaller head than normal. The symptoms of microcephaly are impaired cognitive development, delayed speech, facial abnormality, dwarfism, hyperactivity, difficulties with coordination and balance, problems with behavior or attention, mentally retarded and other brain abnormalities. A microcephalic individual usually also has a brain of diminished size of at least 4 standard deviations below the age and sex-matched means, though often normal in structure. Microcephaly is of two types; congenital microcephaly which occurs at birth and postnatal microcephaly which occurs later in life. Microcephaly may be caused by genetic abnormalities as well as physical factors like exposure to drugs, alcohol or certain toxic chemicals in the womb, infection passed to the fetus during pregnancy, severe malnutrition, uncontrolled phenylketonuria in the mother, decreased oxygen to the fetal brain. To date there are eighteen loci have been identified in different population with different genes like Microcephalin (MCPH-1), WD repeat containing protein 62 (MCPH-2), CYCLIN dependent kinase-5 regulatory Subunit Associated Protein (MCPH-3), CANCER Susceptibility Candidate-5 (MCPH-4), Abnormal Spindle like Primary Microcephaly (MCPH-5), Centromere Associated Protein J (MCPH-6), SCL interrupting locus (MCPH-7), Centrosomal Protein 135 (MCPH-8), centrosomal protein 152 (MCPH-9), zinc finger protein 335 (MCPH-10), Polyhomeotic like Protein (MCPH-11), Cyclin dependent Kinase 6 (MCPH-12), Centrosome associated Protein E (MCPH-13), Spindle assembly abnormal protein-6 homolog (MCPH-14), Major facilitator superfamily domain containing 2A (MCPH-15), Ankyrin repeat and LEM domain containing 2 (MCPH-16), Citron rho-interacting serine/threonine kinase (MCPH-17) and WD repeat and FYVE domain containing 3 (MCPH-18). Mutation in the ASPM gene at the MCPH5 locus appear to be the most common cause of MCPH in Pakistani population.

Current study was aimed for identification of pathogenic variants in microcephaly patient and to evaluate the pathogenicity of identified pathogenic variants. Two families (A and B) were selected and sampled from district Kohat. Highly polymorphic markers were run for the linkage analysis. Linkage of both the families was established on ASPM gene present on MCPH5 locus. After confirming a significant linkage to ASPM gene. Exon 17 was amplified as a founder nonsense mutation is present in the pashtoon ethnicity. After the evaluation of sequencing data a recurrent nonsense mutation (c.3978G>A; p.W1326*) in exon 17 identified in the studied families.

Keywords: MCPH, ASPM, linkage, Nonsense mutation

EPP 31

Molecular docking study of *Lactobacillus* sp. surface layer proteins with epidermal growth factor receptor

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Host microbial interactions had significant factors in maintains homeostasis and immune-related activity. One such interaction made by *Lactobacillus* sp. with the help of Surface layer proteins had been studied through a computational approach. Through the implementation of the molecular docking for the surface layer protein A, we have shown the surface layer protein A, protein-protein interactions are higher in cellular receptors with epidermal growth factor receptor at an -34.45 ΔG and -51.19 ΔG through molecular docking with Erb3 and $\alpha IIB-\beta 3$. This protein-protein interaction study will forward to the microbial-based drug therapeutics.



**Toxicity Profile of Partially Purified Fractions of *Azadirachta indica* A.
Juss. Leaf on Albino Rats and Brine Shrimp Models**

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Due to the increased applications of medicinal plants in the past decades for the treatment and management of various human illnesses, screening of their potential toxic components is of utmost importance to guarantee their safety. Hence, this research was aimed at identifying and partially purifying the toxic agents from the leaf of *Azadirachta indica* using toxicity-guided protocol on Albino rats and Brine shrimp models. Different doses of *A. indica* leaf crude methanol, hexane, ethyl acetate, n-butanol and aqueous extracts at 1000 mg/kg b.wt., 2000 mg/kg b.wt., 3000 mg/kg b.wt. and 5000 mg/kg b.wt. were administered to four (4) groups of rats (for each crude extract); groups 2, 3, 4 and 5 respectively for the determination of median lethal dose (LD50). The crude extract with lowest LD50 (on albino rats) was selected and further used for the toxicity screening (after separation using column and thin layer chromatographic techniques) on Brine shrimp. The LD50 values were determined to be < 5,000 and = 5,000 mg/kg b.wt. for methanol and hexane extracts respectively, while, > 5,000 mg/kg b.wt. for ethyl acetate, n-butanol and aqueous extracts. Among the chromatographic fractions, fractions I and Q produced 90 and 80 % mortality rate on Brine shrimp nauplii respectively. Based on these findings, chromatographic fractions I and Q may likely contain the most toxic agents in *Azadirachta indica* leaf. Hence, they were selected for further characterization and structural elucidation.

Keywords: *Azadirachta indica*; Toxicity profile, LD50; Albino rats; Brine shrimp.

**ACTIVITIES OF ARYLAMIDASE AND MYROSINASE AS INFLUENCED BY
INSECTICIDES FLUBENDIAMIDE AND SPINOSAD**

RUNNING TITLE: Interactions with enzyme activities present in soil

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This research was aimed to investigate the non-target effects of flubendiamide (a neonicotinoid) and spinosad (a biological insecticide) on the activities of enzymes, such as arylamidase (produces glucose from sinigrin) and myrosinase (catalyzes the L-leucine β -naphthylamide to form β -naphthylamine) in two diverse soils (black and red clay). Soil samples were collected from the follow groundnut (*Arachis hypogaea* L.) fields of Anantapur district, Andhra Pradesh, India. Insecticides were applied as commercial formulations to the soil samples at different concentrations (1.0, 2.5, 5.0, 7.5, 10.0 kg ha⁻¹) and then incubated under laboratory conditions for different time intervals (10, 20, 30 and 40 d). The soil samples were subjected for physicochemical characteristics, and then soil enzyme activities were analyzed after their respective incubations. The enzyme activities decreased significantly ($p \leq 0.05$) when pesticide concentration was 10 kg per ha⁻¹ soil. Application of insecticides at low concentrations (1.0-2.5 kg ha⁻¹) caused a stimulation effect on the activities of studied enzymes. Spinosad was more effective than flubendiamide in all pesticide concentration of enzyme activities. Our results showed that, insecticides application at (>5.0 kg ha⁻¹) soils for prolonged incubations have a suppressive effect on the investigated soil enzyme activities.

Key Words Arylamidase; Insecticides; Myrosinase; Tropical soil.



Role of Bio-energy in Emerging Bio-Economy

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Bio-energy refers to electricity that is generated from organic matter, known as biomass. This can be anything from plants, agricultural and food waste and even sewage.

The term bioenergy also covers transport fuels produced from organic matter. Bioenergy is renewable energy made available from materials derived from biological sources. Biomass is any organic material which has stored sunlight in the form of chemical energy. As a fuel it may include wood, wood waste, straw, and other crop residues, manure, sugarcane, and many other by-products from a variety of agricultural processes. Bio based economy refers to economic activity involving the use of biotechnology in the production of goods, services, or energy from biological material as the primary resource. Resources, Technologies, Sustainability and Policy provides with a complete understanding on how bioenergy technologies fit into the new bioeconomy paradigm. Sections focus on the main resources and technologies for bioenergy and its integration in energy systems and biorefining chains, analyze the available methodologies for assessing the sustainability of bioenergy, and address and the propose approaches that are demonstrated through concrete case studies. Sources of biomass include agricultural crops, animal and plant wastes, algae, wood and industrial waste. The type of biomass will determine the type and amount of bioenergy. For example, agricultural crops, like corn can be used to produce liquid biofuels such as ethanol and biodiesel. Wet wastes like manure used to produce biogas through anaerobic digestion, which can be combusted to generate electricity and heat or upgraded into a transport fuel, bio methane. The carbon dioxide released from biomass during production of bioenergy is from carbon that circulates the atmosphere in a loop through the process of photosynthesis and decomposition. Therefore, production of bioenergy does not contribute extra CO₂ to the atmosphere like fossil fuels. Fossil fuels are a finite resource, developed through geological processes over millions of years and their use represents a one-way flow of GHGs from beneath the earth's surface to the atmosphere. Bio-energy would play vital role in emerging bio economy. The present paper highlights the future perspectives of the bio-energy which helps in the development of Bio economy of the world.



Effects of *Telfairia Occidentalis* Seeds Meal on Serum Immunoglobins and Lipid Profile of Male Albino Wistar Rats.

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In this study, the effect of *Telfairia occidentalis* seed diet on the serum immunoglobulin's and lipid profile of adult male rats were evaluated in a total of forty adult albino rats 101-136grams. The rats were separated into four groups of ten rats each. The groups were as follows: A, rats fed on standard rat feed, B, rats fed on rat feed supplemented with 5% *T. occidentalis*, C, rats fed on rat feed supplemented with 15% *T. occidentalis* and D, rats fed on rat feed supplemented with 30% *T. occidentalis*. The study lasted for 28days. At the end of 28days, the rats were bled and blood collected, processed and the serum obtained used for assessment of immunoglobulin profile, lipids and lipoproteins. Immunoglobulin profile was carried out using immunoturbidimetric assay while lipids and lipoproteins were done using standard methods. The result showed that there were significant increase ($p < 0.05$) in serum IgG and HDL-cholesterol. Conversely, the result also showed a significant decrease ($p < 0.05$) in total and LDL- cholesterol relative to control while no effect was observed in serum IgM and Triglyceride. The results suggest that *Telfairia occidentalis* seeds diet could assist in boosting immunity and reducing cardiovascular risk.

Key words: *Telfairia occidentalis*, Dyslipidaemia, Immunoglobulin, Lipoproteins, Wistar Rat



ASSESSMENT OF BACTERIA CARRIAGE ON THE HANDS OF SOME STUDENTS OF A TERTIARY INSTITUTION IN NORTH-WEST, NIGERIA

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Infections are easily acquired and transferred through hand contacts. This study was aimed at isolating bacteria from the hands of some students of Ahmadu Bello University, Zaria, Nigeria and to carry out antibiotics susceptibility testing on the isolates. Swabs from the hands of twenty students each from five faculties (Pharmaceutical Sciences, Medicine, Art, Science and Education) in Ahmadu Bello University Samaru Campus Zaria, were collected and investigated for bacterial contamination using their morphology and biochemical tests. Antibiotics susceptibility of the bacterial isolates was carried out using Kirby Bauer agar diffusion method. The bacteria isolated from the sampled hands were *Staphylococcus aureus* (68%), *Escherichia coli* (16%), *Streptococcus spp* (10%) and *Klebsiella pneumonia* (6%). The antibiotic susceptibility pattern showed that the isolates were susceptible to gentamicin and ciprofloxacin but highly resistant to beta lactam antibiotics. The result of this research showed that the hands of the sampled students were contaminated. There is the need for intensive sensitization on hand hygiene among the students especially in this global pandemic period.

Key words: Hand contamination, hand hygiene, antibiotics susceptibility.



Effect of *Boswellia dalzielii* (Hutch.) Stem Bark Extract on Pain and Inflammation in Albino Rats

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Inflammation is increasingly found to be involved in the development of several chronic diseases. Although steroidal anti-inflammatory drugs and NSAIDs are currently used to treat inflammation, these drugs have not been entirely successful and are accompanied by unexpected side effects. The aim of this study was to carry out phytochemical screening and to evaluate analgesic effect and anti-inflammatory activities of the methanolic stem bark extract of *Boswellia dalzielii*. Crude solvent extraction and phytochemical screening was done using standard methods, acute toxicity (LD50) studies was carried out using OECD guideline 423, analgesic effect was evaluated using acetic acid induced writhing test, while the anti-inflammatory activity was done using formalin induced hind paw edema model. The results for the phytochemical screening showed the presence of saponins, tannins, alkaloids, flavonoids, terpenoids and glycosides in the stem bark extract of *Boswellia dalzielii*. Steroids were however not detected. The results indicated that the extract significantly ($p < 0.05$) reduced the number of writhes by 36.8, 43.2 and 50.5% at 150, 300 and 600 mg/kg respectively; the standard drug, piroxicam (10 mg/kg) reduced the number of writhes by 53.7%. The extract significantly ($p < 0.05$) and dose-dependently inhibited formalin-induced paw oedema at the 3rd, 4th and 5th hour post treatment. The intra peritoneal LD50 of the root extract was found to be greater than 3000 mg/kg b.w, suggesting that the extract is fairly non-toxic and safe. The stem bark extract of *Boswellia dalzielii* has significant analgesic and anti-inflammatory activities, which might provide leads in the ongoing search for analgesic and anti-inflammatory agents from plants.

Key words: *Boswellia dalzielii*, anti-inflammatory activity, analgesic effect, anti-inflammatory drugs, paw oedema

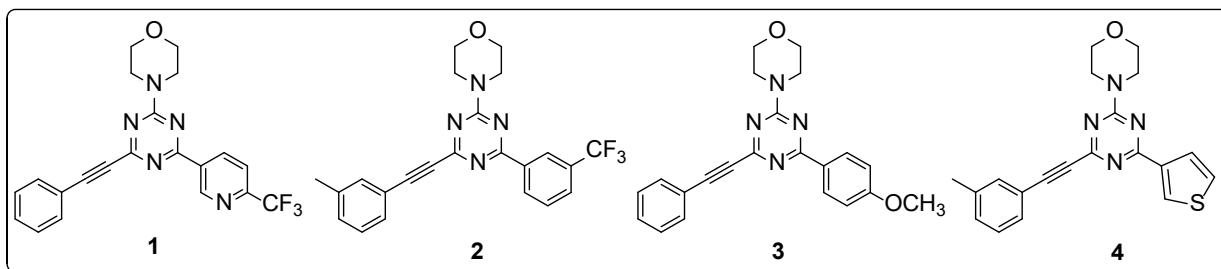
In Vitro Evaluation of Cytotoxic Effect of 4-Aryl-6-arylethynyl-1,3,5-triazin-2-yl morpholines

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s-Triazine derivatives have captured an immense interest due to broad spectrum of biological activities.¹ Two different routes have been majorly followed by the researchers for preparation of a range of these compounds *viz.*, cyclization of guanidines or amidines² and substitution reactions on cyanuric chloride.³ In this perspective, the current study aimed at the synthesis of a series of 2,4,6-trisubstituted triazines from 1,3,5-trichlorotriazines and screened their cytotoxic activity on human Vero kidney epithelial, PC3 prostate and HeLa cervical cell lines by MTT colorimetry assay.⁴ Out of the **23** compounds investigated for inhibitory effect at different concentrations of 6.25, 12.5, 25, 50 and 100 μ M in 24 and 48 h time points, three compounds (**1-3**) containing $-CF_3$, $-OCH_3$ substituents and one (**4**) without any substituent on the aryl/heteroaryl side chains decreased the rate of proliferation of cancer cell lines at concentration of just 12.5 μ M. The MTT assay showed that compound **1** bearing pyridine ring with $-CF_3$ group accomplished a very good antitumour potential with more than 60% of cell death of all the cells (Vero, PC3 and HeLa cell lines). And compounds **2** and **3** furnished inhibition to greater than 50% of cell death on Vero and PC3 cell lines. Noticeably, thiophene group containing compound **4** presented comparatively profound activity on Vero and HeLa cell lines. These compounds can thus be used as potent therapeutic agents for various cancer cell lines due to their cytotoxic and apoptotic effect.



ASSESSMENT OF POTENTIAL OF SUGARCANE BAGASSE AND FUNGI IN HEAVY METALS REMOVAL FROM REFINERY EFFLUENT

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The presence of heavy metals and other chemical wastes in water bodies, especially those originated from petroleum refineries has been an increasing cause for concern, as it presents a dire environmental hazard. This threatens the natural aquatic environment, as well as poses serious health hazards. In most cases, these heavy metals have been reported to persist in those effluents even after treatments. This research was aimed at assessing the ability of sugarcane bagasse, a readily available waste, together with fungal isolates *Aspergillus flavus* and *Trichophyton* species in removal of heavy metals: Nickel, Mercury and Arsenic from raw refinery effluent, done by assessing their performance singly and in co-culture with the sugarcane bagasse as a growth medium. This was carried out by passing effluent through sorption columns A-E, as well as testing the performance of the sugarcane bagasse alone (uninoculated) in two cases (sterilized and unsterilized) and inoculated with either or both of the fungal isolates (A = unsterilized, uninoculated; B = sterilized, uninoculated; C = sterilized, inoculated with *A. flavus*; D = sterilized, inoculated with *Trichophyton* species; E = sterilized, inoculated with *A. flavus* + *Trichophyton* sp.). Results of this experiment revealed that Nickel and Mercury ions were present in high amount of 1.149mg/L and 484.78mg/L respectively, while Arsenic ions were absent. Removal of Mercury and Nickel was found to be very efficient in all the sorption columns A-E, where sorbent D removed the highest amount of Nickel (1.03mg/g), while column A sorbent removed the least amount (0.89mg/g); sorbent A removed highest Mercury ions (437.40mg/g) while sorbent D removed the least (428.45mg/g), with removal efficiency between 95-97% in Nickel and >97% efficiency in Mercury. There was no significance statistically between removal efficiency and type of sorbent used as shown by results conducted using one-way analysis of variance (ANOVA). It was therefore concluded that sugarcane bagasse, inoculated or un-inoculated, could serve as a very promising material for removing heavy metals from refinery effluents, which could also help in reducing its nuisance as unwanted waste from the environment.

KEY WORDS: Sugarcane Bagasse, Heavy metals, Fungi,

Detection of *Plasmodium falciparum* genes associated with antimalarial drug resistance among malaria patients in Kaduna State, Nigeria

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Objective: To detect *Plasmodium falciparum* genes associated with antimalarial drug resistance among malaria patients in Kaduna State, Nigeria.

Methods: Three hundred (300) blood samples were collected from consenting individuals attending selected hospitals, in the three senatorial districts of Kaduna State, Nigeria. A structured questionnaire was used to obtain relevant data from the study participants. The samples were screened for malaria parasites by microscopy and malaria rapid diagnostic test kit. Polymerase Chain Reaction was used for detection of the drug resistance genes. *Pfcr*, *pfmdr1*, *pfdhfr*, *pfdhps* and *pfatpase6* genes were detected at expected amplicon sizes from the malaria positive samples in this study. The *pfatpase6* PCR amplicons were sequenced and a phylogenetic tree was created to determine their relatedness.

Results: *Pfcr* (80%) had the highest prevalence, followed by *pfdhfr* (60%), *pfmdr1* (36%) and *pfdhps* (8%). *Pfatpase6* was also detected in 73.3% of the samples, and a phylogenetic tree showed relatedness between the *pfatpase6* sequences in this study and those deposited in the GenBank.

Conclusion: We detected *Plasmodium falciparum* genes associated with drug resistance to commonly used antimalarials in the study area.

Keywords: Antimalarial, resistance, genes, amplicons



Application of zein coatings on the quality of fresh cut papaya

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Fresh and minimally processed fruits and vegetables are one of the major growth segment in the food retail industry. This new market trend has leads to increase in demands to the food industry for seeking new strategies to increase storability and shelf life and to enhance microbial safety of fresh produce. A fresh-cut fruits are physically altered from its original state (trimmed, peeled, washed and/or cut), but remains in a fresh state. The production of fresh-cut fruits is increasingly becoming an important task as consumers are more aware of the importance of healthy eating habits and have less time for food preparation. Edible coatings are a new promising technology helps in maintaining the quality and extending the shelf-life of minimally processed fruits or ready to eat fruits. An edible coatings or films are defined as a thin layer of material which is suitable for consumption by the consumer, can be applied on or within the food by wrapping, dipping, brushing or spraying and act as barriers against transmission of gases, vapors and solutes and provide mechanical protection. Edible coatings create a modified atmosphere within the fruits internal matrix and regulates the processing of biochemical reaction, control on biochemical reactions results the delay of ripening process. In the present study, fresh cut papaya fruits were coated with Zein protein biopolymer (5% and 10 %) and fortified Zein (5% and 10 %) was used to coat the fresh cut papaya fruits for analyzing shelf life quality. Ascorbic acid (5% and 10%) was used as fortifying agent in zein coating solution for few treatments and noted the ascorbic acid levels in the fruits. Total fruit samples were divided and coated with various concentrations and fortifications and without coating were kept which was serve as control. All samples were stored at refrigerated conditions ($5 \pm 1^\circ \text{C}$) and studies have been conducted for their shelf life progress (a period of 15 days). The findings of the study revealed that the addition of ascorbic acid to the coatings helped to preserve the natural ascorbic acid content in fresh cut papaya fruits and found the retention of the ascorbic acid in fruits. Zein coatings delayed the colour change, lower weight loss, firmness retention, maintained the carotenoids content and inhibited the growth of microorganisms. Zein biopolymer coating showed a potential impact as commercial coatings in preserving and extending the life of minimally processed fresh cut papaya fruits under refrigerated storage conditions.



Green synthesis of silver nanoparticles using *Calotropis gigantea* leaf extract and assessing their bactericidal property

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Green synthesis/Biogenic synthesis of silver nanoparticles recently became popular in biomedical application due to their unique physical, chemical and biological properties. They are non -or less toxic to normal cells and bactericidal to many pathogenic bacteria and, hence, silver nanoparticles can be used as antimicrobial agent in wound dressing to prevent wound infections from certain bacteria. In the present study we have prepared silver nanoparticles using *Calotropis gigantea* leaf extract and confirmed their morphology and size under SEM and DLS, respectively. The obtained nanoparticles ranged from 105-122 nm in size and showed bactericidal activity against wound infections causing bacteria such as *Escherichia coli*, *Klebsiella pneumonia* and *Pseudomonas aeruginosa* by agar disc diffusion methods.

Key words: Silver nanoparticles, SEM: Scanning electron microscopy, DLS: Dynamic light scattering.



Biodecolorization of an azo dye, Eriochrome red B (ERB) by *Penicillium steckii*

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The aim of this study is to evaluate the biodecolorization efficiency of *Penicillium steckii* on Eriochrome red B dye. *Penicillium steckii* was isolated from dye wastewater soil and Eriochrome red B dye purchased from DyStar Company, Heldieberg, Germany. Physicochemical parameters were varied to determine the best conditions for optimal decolorization. GC-MS and HPLC analyses were carried out to determine the metabolic fates of the dye after the experiment. Toxicity analyses were conducted to confirm the non-toxic states of the dye after biodecolorization. Optimum decolorization (98%) was achieved at a concentration (10 mg L⁻¹), temperature (36 °C), and pH 6 during 5 days optimization scale up studies. UV—Vis spectroscopy, HPLC and gas chromatography-mass spectrometry was used in analyzing the degraded products of the dye. The GC-MS analysis revealed the production of three metabolites; naphthalen-1-ol, 2-nitronaphthalene and naphthalene after degradation of Eriochrome red B dye. A possible metabolic pathway for the degradation of Eriochrome red B dye by *Penicillium steckii* was proposed. The phytotoxicity study revealed the nontoxic nature of the final metabolites. The detoxified status of the dye metabolites were confirmed with significant growth of plumule and radicle coupled with increase in germination percentage of *Vigna unguiculata* and *Triticum aestivum*.

Keywords: Biodecolorization; *Penicillium steckii*; Eriochrome red B dye, detoxification



Effect of malaria parasitaemia on *Plasmodium falciparum* infected human erythrocytes oxidative stress biomarkers levels

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The present study investigated the effect of malaria parasitaemia on *Plasmodium falciparum* infected human erythrocytes oxidative stress biomarkers levels. Seventy (70) human subjects comprising of 50 *P. falciparum* malarial infected and 20 non-infected (control) subjects between 10-60 years were selected for this study. RDT test and microscopy were carried out to ascertain the presence of *P. falciparum*. They were grouped based on age, sex criteria and level of parasitaemia. Blood samples were collected for the determination of *P. falciparum*, level of parasitaemia and for anti-oxidant assay; to assess the activities of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), malondialdehyde (MDA), reduced glutathione (GSH), total protein (PRO) and Parasite density. This study showed that there was a significant increase in the mean level of PRO, CAT, MDA and SOD among the females in the *P. falciparum* infected patients compared to those in the control subjects and a decrease in GPx level, also, there was a significant increase in the mean level of MDA and SOD among the males in the *P. falciparum* infected patients compared to those in the control subjects and a decrease in GSH and GPx level. MDA and PRO level were found to be significantly higher ($p < 0.05$) among age group (10-20) in the *P. falciparum* infected patients and significantly lower in the control subjects when compared to other age groups. CAT level was significantly higher ($p < 0.05$) among age group (31-40) in the *P. falciparum* infected patients and significantly lower in the control subjects when compared to other age groups. SOD level was significantly higher ($p < 0.05$) among age group (10-20) in the *P. falciparum* patients and significantly lower in the control subjects when compared to other age groups. GSH level was marginally higher among age group (10-20) in the *P. falciparum* patients and lower among age group (21-30) in the control subjects when compared to other age groups. GPx level was marginally higher among age group (41-50) in both *P. falciparum* patients and control subjects when compared to other age groups. This study indicates that high parasitaemic patients are at greater risk of oxidative stress than low parasitaemic ones.



COVID-19 and genetic polymorphism

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Novel Coronavirus disease – 2019 (COVID-19) has been playing an important role in health care burden and shows adverse global economic impact. People, who contracted with COVID-19, responded differently with the available treatment indicating tricky situation for health care providers. Individual variability in treatment responsiveness (severity of disease) may be attributed to the genetic makeup of the individual and the virus (as mutation rate is more in viruses). At this juncture, the renin-angiotensin system (RAS) came to the limelight of researchers in general and angiotensin converting enzyme (ACE) in specific. Expression of ACE is different in people and it is based on the genetic makeup of the individual and drugs they use for other ailments. This variable expression may lead to alteration in contracting the disease, severity of disease as well as in the outcome of therapy (responsiveness of the individual to therapy). Many genome wide association studies were carried out to know the effect of the polymorphism of genes involved in RAS and their effects on individual's responsiveness of therapy. The insertion/deletion (I/D) polymorphism of ACE1 gene and G8790A polymorphism of ACE2 gene are such polymorphisms which were shown to be associated with the altered levels of these enzymes and they may also affect the infectivity rate and outcome of therapy. Such polymorphisms will be discussed.



BIOTECHNOLOGY IN HORTICULTURE CROPS

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Harnessing biotechnology in horticultural crops, influence of plant materials, physical, chemical factors and growth regulators on growth and development of plant cell, tissue and organ culture. Use of bioreactors and in vitro methods for production of secondary metabolites, suspension culture, nutrition of tissues and cells, regeneration of tissues, ex vitro, establishment of tissue cultured plants. Construction and identification of somatic hybrids and cybrids, wide hybridization, in vitro pollination and fertilization, haploids, in vitro mutation, artificial seeds, cryopreservation, rapid clonal propagation, genetic engineering in horticulture crops, use of molecular markers. In vitro selection for biotic and abiotic stress, achievements of biotechnology in horticultural crops. Historically application of in vitro culture methods to fruit crops was to eliminate disease causing viruses from strawberries. Meristem tip culture has since become an integral part of virus indexing programmes for a number of fruit crops, usually in conjunction with thermotherapy. In some cases, it has been necessary to micro-graft the meristem tip into an in vitro- grown seedling as is done for citrus.

Within the past 25 years, micro-propagation of fruit crops has become an important application of in vitro technology. Strawberry was the first fruit crop for which the method was developed. Now many fruit crops are being micro-propagated commercially. More recent uses of in vitro culture emphasize application for genetic improvement of fruit crops. These applications include production of hybrid plants from fused protoplasts, somaclonal variation and mutagen-driven changes in regenerated plants, haploids plants from anther culture and transfer of specific genes via Agrobacterium-mediated transformation.

KEYWORDS: Horticulture crops, Fruits, Vegetable, In vitro technology, Biotechnology, Cybrid.

Elucidating Naturally occurring antioxidants, ANTOX expression, and its functioning with plant hormones to mediate abiotic stress response in Medicinal plants

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The oxygen molecule is a free radical as it has two impaired electrons that have the same spin quantum number. This spin constraint composes O favor to allow acceptance of its electrons one at a time, causing production of reactive oxygen species (ROS). ROS are also byproducts of certain metabolic pathways of chloroplast, mitochondria and peroxisomes. Oxygen generated in the chloroplasts during photosynthesis can accept electrons passing through the photosystems, thus forming O. The ROS comprising O, H O, ¹O, HO[•], OH[•], ROOH, ROO[•], and RO[•] are highly reactive and toxic and causes damage to proteins, lipids, carbohydrates, DNA which ultimately results in cell death. Accumulation of ROS under salinity stress is a major cause of loss of crop productivity worldwide. ROS modulates expression of diverse genes involving plant growth and development, cell cycle, plant hormones signaling, programmed cell death (PCD), stress responses, pathogen defense, and primary pathways such as photosynthesis. To protect plants from the risk associated with ROS, the antioxidants have become paramount importance in the field of natural and medical sciences. The components of antioxidant defense system are enzymatic and non-enzymatic antioxidants. Enzymatic antioxidants include SOD, CAT, APX, MDHAR, DHAR and GR and non-enzymatic antioxidants are GSH, AA (both water soluble), carotenoids and tocopherols (lipid soluble). The present review focuses on the biochemistry of functioning of ROS and antioxidants mediated through plant hormone particularly ethylene and brassinosteroids with particular emphasis to medicinal plants.

Key words Abiotic stress, antioxidants, gene expression, medicinal plants, ROS.

**EVALUATION OF PHYSICOCHEMICAL PROPERTIES AND
BACTERIOLOGICAL QUALITY OF TRADITIONAL CEREAL PUDDING (TUWO)
SOLD AT SAMARU, ZARIA**

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This study was aimed at evaluating physicochemical parameters and bacteriological quality of traditional cereal puddings (*tuwo*), with a view to identify the bacteria associated with the food, and to evaluate their antimicrobial susceptibility profile. Fifteen samples of different cereal puddings sold within Samaru, Zaria were randomly collected and analyzed. The bacterial load was determined using standard laboratory procedures. Physicochemical parameters that may contribute towards bacterial colonization of the food samples were analyzed using standard techniques. The isolated bacteria were characterized by microscopy and biochemical characterizations and were subjected to antibacterial susceptibility using Kirby-Bauer disk diffusion method. The traditional cereal puddings analyzed were all found to be within the safe range of international food regulatory agency; hence the foods are safe for human consumption, except for sample S10, which recorded contamination beyond the statutory safe limit of $\geq 10^5$ cfu/g. The bacterial loads of the samples range from $1.97 \times 10^2 - 6.20 \times 10^7$ cfu/g. Highest bacterial count was recorded in sample S10, with least bacterial counts recorded in sample S14. Physicochemical parameters tested recorded various results. There is no statistical significant relationship between the bacterial loads and all the physicochemical parameters tested, except for moisture content ($P= 0.045$ at 0.05). The bacterial species isolated are *Escherichia coli*, *Bacillus cereus* and *Staphylococcus aureus*. *Staphylococcus aureus* recorded highest susceptibility to ciprofloxacin 7(100%) and complete resistance to gentamicin and amoxicillin

0(0%). *Escherichia coli* recorded highest sensitivity to gentamicin 8(100%), ciprofloxacin 8(100%) and streptomycin 8(100%), with absolute resistance to Zinnacef 0(0%) and Erythromycin 0(0%). However, *Bacillus cereus* isolates recorded highest susceptibility to Pefloxacin 6(100%), with multiple drug resistance. Isolation of multiple drug resistant spore-forming bacteria has a serious health concern. So, the level of hygiene employed in the preparation of cereal puddings should be improved to avoid unnecessary outbreak of foodborne disease by such stubborn bacterium at the study area.

Keywords: (antimicrobial susceptibility, bacterial load, cereal pudding, physicochemical parameters)

EPP 49

ROLE OF COMPLEMENT IN HUMAN SERUM *INVITRO* BACTERICIDAL ACTIVITY AGAINST *SALMONELLA TYPHI* IN RELATION TO SERO GROUPS

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A series of more than 35 proteins facilitated a major role in fighting the foreign invaders in human body and other warm-blooded animals, those named complement system. We demonstrated the level of complement dependency in the *in vitro* killing of *Salmonella Typhi* using a human serum. Total of one hundred and forty seven (147) human serum were collected from asymptomatic volunteers by venipuncture, their sero groups were determined by reverse blood grouping method. Strain of *S. Typhi* were collected from Wudil general hospital and identified molecularly at centre of biotechnological research of Bayero University, Kano. Serum bactericidal assay was done at microbiology laboratory of Wudil general hospital. Non-complement dependent pathways was demonstrated by treating the freshly harvested serum with EDTA. Data obtained was subjected to two-way analysis of variance and considered significant at $p \leq 0.05$. Complement dependent pathways in all the sero groups' shows a more than 50% kills, in which both A, AB, B and O kill 74.98%, 67.87%, 78.53% and 78.60% respectively, however, no significant statistical difference were found at $p \leq 0.05$. While the non-complement dependent pathways revealed kills percentage of 59.27%, 57.86%, 59.21% and 58.60% for

A, AB, B and O sero groups, also no significant statistical difference at $p \leq 0.05$. Moreover, in comparing the complement and non-complement dependent pathways, data analysis shows a significant difference with p values of 0.001, 0.003, 0.006 and 0.0008 for A, AB, B and O sero groups. We concluded that, ABO sero-groups plays an important role as infection determinants, where AB sero-group have are more chances to *S. Typhi* infection than other sero-groupings. We suggested that more host's genetical parameters need to be studied on treatment of infection rather than the microscopy, culture and sensitivity of the pathogens alone.

Key words: Human serum, Complement and *Salmonella Typhi*

EPP 50

Use of Cellulose and its Graft copolymers in Purification, Separation and other Water based Technologies: A Brief Review

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Cellulose is abundant in nature and as such it provides excellent materials for membranes both in native and functionalized form. Grafting of suitable monomers onto cellulose with hydrophobic and hydrophilic moieties imparts longer stability and high degree of selectivity. In present study an attempt has been made to review the use profile of cellulose based graft copolymers in water-based technologies. Due to industrial growth and other man-made factors, the pollution level in water is ever increasing. Water is flooded with toxic chemical species including metal ions. Thus, there is a huge demand for development of eco-friendly and low cost materials for treatment of wastewater. Natural polymer like cellulose based hydrogels are finding increased use in low cost technologies for removal of metal ions from water bodies as conventional synthetic ion exchangers are quite expensive. Incorporation of polymers by grafting or network formation like acrylamide onto cellulose leads to improvement of some intrinsic drawbacks of biopolymers, especially, against their ease of weatherability. Incorporation of new functionalities on these polymers by grafting or other chemical modifications, yield reactive and environment responsive or smart hydrogels. Cellulose membranes were first to be used in



many modern applications like reverse osmosis. Cellulose phosphate is used in separation of Fe^{+3} , Cu^{+2} and Ni^{+2} and in Cu-Na technology, oxycellulose in separation of lead, bismuth and silver, and radioisotopes of ^{99}Sr and ^{137}Cs . Some gels are developed that can selectively recognize, absorb and release heavy metal ions. Blending of alginic acid with cellulose cuoxam afford ion exchange membranes in water swollen state. Dextran is another potential natural polymer useful in concentration and separation of Cu^{+2} , Ni^{+2} and Fe^{+3} ions. Apple waste has been used to remove Cu^{+2} ions from its aqueous solutions. Acrylamide grafted onto saw dust has been found to absorb heavy metals. Cellulose acetate grafted with poly(acrylamide) has been used in reverse osmosis process for separation of water containing $(\text{NH}_4)_2\text{SO}_4$. Thus, these polymers have a wide spectrum of applications.

Keywords: Graft copolymers, hydrogels, reverse osmosis, grafting.

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ANTIBACTERIAL ACTIVITIES OF *ANOGEISSUS LEIOCARPUS* LEAF AND STEM BARK EXTRACTS AGAINST SOME CLINICAL ISOLATES

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Anogeissus leiocarpus is a graceful tree of Africa, commonly known as “African birch” belonging to the family Combrateceae. It is a tall evergreen tree native to savannah of tropical Africa and has a wide range of medicinal uses including antimicrobial activities. This study aimed at determining the antibacterial effect of the aqueous and ethanol leaf and stem bark extracts of *Anogeissus leiocarpus*. The leaves and stem bark of the plant were collected, dried, ground and extracted with distilled water and ethanol. Antibacterial activity against clinical isolates of *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* were carried out using agar well diffusion method. The leaf and stem bark extracts shows antibacterial activities against *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The minimum inhibitory concentration for ethanolic stem bark against *E. coli*, *S. aureus* and *P. aeruginosa* obtained in this study were 7.50, 5.00 and 7.50mg/ml respectively, The MIC for ethanol leaf extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 10.00, 7.50 and 20.00mg/ml, The minimum inhibitory concentration for

aqueous leaf extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 15.00, 7.50 and 10.00mg/ml, While the MIC for stem bark aqueous extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 15.00, 10.00 and 7.50mg/ml respectively. The minimum bactericidal concentration for ethanolic stem bark against *E. coli*, *S. aureus* and *P. aeruginosa* obtained from this study were 15.00, 10.00 and 10.00mg/ml respectively, The MBC for ethanol leaf extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 20.00, 15.00 and 20.00mg/ml, the MBC for stem bark aqueous extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 15.00, 20.00 and 15.00mg/ml respectively while The minimum bactericidal concentration for aqueous leaf extract against *E. coli*, *S. aureus* and *P. aeruginosa* were 15.00, 15.00 and 20.00mg/ml Therefore, *Anogeissus leiocarpus* has been shown *potential antibacterial activities against the studied organisms which may be due to the phytochemical constituents present in the plant.*

Keywords: *Anogeissus leiocarpus*, Antibacterial activity, Leaf, Stem bark

EPP 52

Assessment of the Probiotic Potential of *Lactobacillus* species Isolated from Selected Brands of Yoghurt sold in Zaria, Kaduna State Nigeria

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Probiotics are non-pathogenic and non-toxicogenic bacteria that serve as a natural barrier against pathogenic enteric bacteria. Yoghurt and other fermented dairy products are the most common source of probiotics. This study was carried out to assess the probiotic potential of *Lactobacillus* species isolated from different brands of yoghurt. Nine (9) yoghurt samples consisting of three (3) different brands were purchased from local vendors. The samples were serially diluted, inoculated onto De Man Rogosa and Sharpe (MRS) Agar and incubated anaerobically using a candle jar at 37°C for 24 hrs. Colonies with characteristics colonial morphology of *Lactobacillus* species on MRS agar were

sub-cultured fresh MRS agar. The isolates were further identified and characterized microscopically and biochemically. The isolates were screened for their ability to tolerate low pH, tolerate bile and exhibit antibacterial activity. The nine (9) isolates of *Lactobacillus* species obtained consist of 7(77.78%) *L. plantarum*, 1(11.11%) *L. bulgaricus* and 1(11.11%) *L. salivarius*. All the isolates tolerated low pH and bile salt at different concentrations. Two (2) of the isolates had antibacterial activity against *Escherichia coli*, however none of the isolates had antibacterial activity against *Salmonella* Typhi. Of the three *Lactobacillus* species isolated from yoghurt, *L. plantarum* had the highest occurrence with 77.78%. Two of the *Lactobacillus* species isolated from yoghurt tolerated low pH, bile salt at different concentrations and exhibited antibacterial activity hence possesses probiotic potential.

Keywords: *Lactobacillus* species, probiotic, yoghurt, antibacterial

EPP 53

TOXIC POTENTIAL OF MORUS NIGRA AGAINST HYALOMMA TICKS

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Ticks are important obligatory blood feeding external parasites of human and animals. On a global basis, ticks transmit a greater variety of pathogenic microorganisms, protozoa, rickettsiae, spirochetes, and viruses than any other arthropods and are among the most important vectors of diseases affecting livestock, humans, and companion animals. The economic losses and disease burden due to ticks are managed mainly by acaricide treatment in the form of spray and pour-on formulations. However, some tick species have been become resistant to these acaricides as a result of repeated exposure, and these chemicals may have negative effects on non target organisms including humans. Recently, scientists take great interest in the use of plant extracts as a new control alternative to synthetic acaricide. Plant extracts have lesser mammalian toxicity and lesser persistence in the environment than synthetic acaricide. The present study was conducted to determine toxic potential of medicinal plant *Morus nigra*. Water soluble extract of *Morus nigra* was put in three Petri dishes with 10%, 30% and 50% concentration. Five ticks were put in

each Petri dish and data was recorded after the time interval of 1 hour each. The highest mortality was recorded in 50% concentration while there was no mortality recorded in control group.

Key words: Pathogenic microorganism, economic losses, acaricide

EPP 54

Snakebite Envenomation: Current Status and Future Hope for Vaccination

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Snakebite envenomation is considered as a serious public health issue in many parts of the world causing approximately 1.8–2.7 million cases annually, leading to 81,000–138,000 deaths. Currently, antivenom immunoglobulins (antivenin) derived from animals are the only therapeutic products for the treatment of snakebite envenomation, as there is no known commercially available vaccine against snakebite envenomation in our markets. Antivenom production involves immunizing animals, like horses, sheep or hens, with venom milked from snakes and then isolating antibodies from the serum. In order to reduce the prevalence of snakebite incidences and considering the limitations of antivenom and its production, this review has outlined some strategies that put hope for future vaccines against snakebite envenomation. Vaccine production is based on the ability to generate antibodies and immunological memory against antigens. Novel immunization strategies using synthetic peptide epitopes, recombinant toxins (or toxoids), or DNA strings as immunogens have demonstrated potential for generating antivenoms with high therapeutic antibody titers and broad neutralizing capacity. Alternative venom dependent approaches utilizing whole venom toxoids, and utilization of cross-linked chitosan, calcium-alginate, or poly (D, L-lactide) polymer nanoparticles have also resulted in the production of antibodies against snake venoms. Hence, these immunological responses against the venom components put hope for the future development of vaccine against snakebite envenomation.

Keywords: Snakebite; Envenomation; Venom; Antivenom; Vaccination



BIOSORPTION EFFICACY OF BIOSORBENTS PREPARED FROM COCOA LEAVES USED FOR REMOVAL OF LEAD POLLUTED WASTEWATER AT BIRNIN GWARI WAR FRONT, KADUNA STATE

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The potential of Acid Treated (ATC) and Untreated Cocoa Leaves (UTC) biosorbents used for removal of Pb²⁺ from wastewater at warfront was studied using batch adsorption technique. Atomic Adsorption Spectroscopy (AAS) was used to ascertain the residual Pb²⁺ concentration after the adsorption process. The optimum operational experimental conditions: adsorbent dose, pH, initial Pb²⁺ concentration and contact time were obtained. It was found that the percentage sorption of Pb²⁺ increased with; higher adsorbent doses (0.8-1 g/25cm³), increase in pH levels (7 - 9), increased Pb²⁺ concentration (between 150 – 200 mg/L) and increased contact time (150 - 180 minutes). The result showed that cocoa leaves have the potential to remove Pb²⁺ polluted wastewater at about 99.8% removal. The biosorbents were characterized using Fourier Transform Infrared Spectroscopy (FTIR). It showed the presence of O-H, O-CO-, N-N=O and -C-H are responsible for the adsorption of Pb²⁺ onto the biosorbents. The adsorption of Pb²⁺ onto ATC and UTC from wastewater at war front best fitted into Pseudo-Second Order Kinetic Model validated by the coefficient of regression R² values close to infinity. The equilibrium sorption data were fitted best into Freundlich isotherms with R² value for ATC is 0.5754 and UTC for 0.6441. The maximum monolayer coverage (Q₀) from Langmuir isotherm model was determined to be 117.65 mg/g for ATC and 53.35mg/g for UTC. The Freundlich Isotherm model showed the sorption intensity (n) of 0.348 for ATC and 0.1557 for UTC indicated favorable adsorption.

Keywords: Cocoa Leaves, Lead, Biosorption, wastewater, Kinetics, Isotherms

**EVALUATION OF SOME ANTI-NUTRITIONAL FACTORS AND MINERAL
COMPOSITION OF *Leptadenia hastata* LEAVE**

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The medicinal value and the consumption of *Leptadenia hastata* has led to the evaluation and ascertaining the adequacy of its leave for minerals composition and the possible effects of anti- nutritional factors on the availability of the required nutrients. The antinutritional factors were determined by standard methods. The mineral elements were also determined using standard analytical methods. The antinutritional factors contents revealed that Phytate ($33.100 \pm 0.66\text{mg}/100\text{g}$), Saponin ($16.330 \pm 1.53\text{mg}/100\text{g}$) and to a lesser extent Hydrocyanic acid ($0.024 \pm 6.52 \times 10^{-4}\text{mg}/100\text{g}$), Oxalate ($0.014 \pm 7.12 \times 10^{-4}\text{mg}/100\text{g}$), and Tannin ($0.003 \pm 2.06 \times 10^{-4}\text{mg}/100\text{g}$). The results also revealed that, the mineral contents as Potassium ($3566.67 \pm 104.08\text{mg}/\text{Kg}$), Sodium ($100.83 \pm 3.82\text{mg}/\text{Kg}$), Phosphorus ($6.81 \pm 0.03\text{mg}/\text{Kg}$), Magnesium ($0.70 \pm 0.10\text{mg}/\text{Kg}$) and Calcium ($1.08 \pm 0.08\text{mg}/\text{Kg}$). Though the present study revealed substantial amount of antinutritional factors, their present may not affect the nutrient availability in the leaves. The concentrations of the mineral elements are also moderate except for potassium.

Keywords: *Leptadenia hastata*, evaluation, antinutritional factors, availability



EPP 57

Role of Mitochondria in Lung Diseases

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Mitochondria are potential organelles, synthesizes required energy for the cell and they plays a dominant role in the reactive oxygen species (ROS) dependent pathway which administrates in the response of different lung diseases such as Hypoxia, Hyperoxia, Chronic obstructive pulmonary disease (COPD) and Lung fibrosis. During hypoxic condition, oxidative stress will generate and it leads to mitochondrial dysfunction, including impairment of electron transport chain, changes occurs in mitochondrial dynamics – fusion and fission, loss of mitochondrial membrane potential, and it is also leads to intrinsic Apoptosis then directs to inflammatory and immune responses - raise of cytokines and apoptotic genes. By using anti-oxidants and anti-inflammatory representatives, targeting the expression level of mitochondrial genes regarding oxidative stress, they can repair and recover the mitochondrial functions then the control of inflammation and immune response, persuade to the recovery from lung disease. We will discuss the role of mitochondrial genes in various lung diseases during my presentation.

Keywords: Mitochondrial dysfunction, oxidative stress, anti-inflammatory, anti-oxidants.

EPP 57a

Synthesis of Gum Karaya Based Interpenetrating Polymeric Hydrogel Network for Anticancer Drug delivery Applications

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The paper describes the development of dual responsive hydrogel network from gum karaya with temperature & pH sensitive monomers by a simple free

radical polymerization method using bis-[2-(methacryloyloxy)ethyl] phosphate as a crosslinker and potassium per sulphate as an initiator. These hydrogels were successfully characterized by the FTIR, DSC, XRD, EDAX and SEM, to know the chemical structure, thermal, crystalline behavior and surface morphology studies. The temperature and pH-sensitive swelling behavior of IPN hydrogels were investigated in different pH solutions, temperature and swelling kinetics. These hydrogel drug successfully encapsulated into hydrogel network. The *in-vitro* drug release profiles will be performed in both pH 1.2 & 7.4 and temperatures at 25 and 37 °C. The release of drug *n* values occurred through Fickian diffusion mechanism and best fitted the Korsmeyer-Peppas model. The drug release mechanism can be analyzed by evaluating the swelling release data using different empirical equations.

Keywords: Gum Karaya, Dual responsive behavior, Anticancer drug, Drug delivery.

EPP 58

EFFECT OF LIQUID ORGANIC FERTILIZER ENRICHED SOIL ON GROWTH PARAMETERS OF *CORCHORUS OLITORIUS*

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An experiment was conducted at Bioresource Development Centre Odi, Bayelsa state in the early planting season of 2017, to determine the yield and growth parameters of *corchorus olitorius* on a liquid organic fertilizer improved soil. The study adopted a randomized block design, with two treatments and three replications. Data was collected from 10(ten) plants that were randomly sampled and the results showed that the application of liquid organic fertilizer significantly improved the plant height, number of leaves, leave length, leave width and stem girth of *corchorus olitorius* above the control (which no fertilizer was used) for 42 days. Based on this finding liquid organic fertilizer can be recommended for maximum growth of *corchorus olitorius*.

Keyword: *corchorus olitorius*, growth parameters, and liquid organic fertilizer



Levels of aflatoxin M₁ among breastfeeding mothers in a rural community, Yobe State, North-eastern Nigeria

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This study was carried out to determine the levels of aflatoxin M₁ contamination among breastfeeding mothers whose newborn babies, between the age of 0-6 months, were on admission in Yobe State Specialist Hospital, Damaturu. A total of 200 urine samples were collected and evaluated for aflatoxin levels using the High-Performance liquid chromatography (HPLC). The results revealed that 93% of breastfeeding mothers were exposed to aflatoxin. The urinary discharge rate of the toxin was 100% in unemployed compared to employed mothers. Informal education and elementary school certificate holders had 100% discharge rate of AFM₁ in the urine. AFM₁ excreted in the urine of lactating mothers within 72hrs of food consumption shows 84% of mothers that took milk were not exposed; meat 100% were exposed; cornmeal 93.4% exposed; dates 93%; ‘Brabisko/Biski’ 30.6%; imported rice 77.7%; native rice 93.4% event taken $p < 0.05$. In connection to socio-statistic factors, the highest concentrations of the toxin were among unemployed mothers within the age category of 18-25 and 34-41 years with 0.05µg/l. The infant's age category between 5-6 months had 0.07µg/l, and ≤ 2 months had 0.04µg/l concentration respectively. The discharged rate of AFM₁ in the urine of infants was 68%. The concentration levels of AFM₁ among infants indicate short time exposure. The consumption of certain nourishing items by lactating mothers if not strictly regulated exposes babies to AFM₁ prompting its discharge in the breast milk that new-born children devour in their initial lives.

Keywords: Aflatoxin M₁; lactating mothers; infants; Urine; HPLC.

**OPTIMIZATION AND KINETIC MODELLING OF BIODIESEL PRODUCED
FROM FIG SEED OIL (A NOVEL FEEDSTOCK) USING RESPONSE
SURFACE METHODOLOGY**

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The seed oil of *Ficus carica* was subjected to transesterification reaction using KOH as catalyst and excess methanol to produce fatty acid methyl ester (Biodiesel). The physicochemical properties of the Fig seed oil and biodiesel was characterized using standard analytical methods. Similarly, the lipid composition was evaluated using gas chromatography coupled with flame ionization detector technique. The various functional groups present in the biodiesel were investigated using Fourier transform infrared spectroscopy. The results of the lipid analysis revealed that polyunsaturated fatty acids were the predominant fatty acid in the seed oil, while the FTIR analysis on the biodiesel, revealed the presence of O-H, C-H, C-O, C-C bonds. The effects of process parameters such as temperature, catalyst concentration, reaction time and methanol/oil ratio were investigated using batch mode. The significance of these process parameters and their attendant effects on the transesterification proficiency were established using full factorial central composite design and were optimized with the response surface (RSM) methodology. From the analysis, the biodiesel gave an optimum yield of 90% when the temperature was at 60°C for 50 min with 0.6g of KOH catalyst and 6:1 methanol/oil ratio. The results of the physicochemical properties were compared with ASTM D6751 standards and the parameter values were in perfect agreement with the standard. Thus, the study proved that fig seed oil is an excellent feedstock for biodiesel production.

Keywords: transesterification, fig seed oil, biodiesel, optimization, central composite design



THE POTENTIALS OF *CYMBOPOGON CITRATUS* (LEMON GRASS) IN THE PRODUCTION OF MOSQUITO REPELLENT CREAM

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Background: An insect repellent is a substance applied to skin, clothing or other surfaces which discourages insects from landing on that surface. Malaria is a life-threatening disease caused by plasmodium parasites. The parasites are spread to people through the bites of infected female Anopheles mosquitoes, called malaria vector. The aim of this research is to formulate mosquito repellent from the extracts of *Cymbopogon citratus*. **Methods:** Fresh *Cymbopogon citratus* leaves were collected and then air dried. It was subjected to percolation and soxhlet extraction processes. In addition both extracts were evaluated for phytochemical analysis and antimicrobial activity using disc diffusion techniques. Furthermore, the extract was used in cream production which served as a mosquito repellent. **Results:** The solvent extraction yielded 1.41g for n-hexane and 2.5g for ethanol while the soxhlet extraction yielded 1.10g for n-hexane and yielded 4. Additionally, it was observed that the n-hexane extract possessed the most effective antibacterial agents with high zone of growth inhibition (28 mm) on *Staphylococcus Aureus* at 500 mg/ml concentration. This efficacy was followed by the ethanol fraction (20 mm) at 500 mg/ml concentration on the same test organism. Furthermore, all the test organisms with the exception of *Escherichia Coli* at all concentrations of n-hexane extracts were inhibited. However, *Salmonella Typhi*, *Escherichia Coli* and *Pseudomonas Aureginosa* were also resistant at some concentrations in both extracts. Moreover, Alkaloids, carbohydrate, flavonoids, steroids, sterols and saponins were revealed with the exception of phenols and tannins in the phytochemical screening.

Keywords: *Cymbopogon citratus*, Mosquito repellent, Percolation, Soxhlet extraction



New technologies in clinical microbiology

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The laboratory of clinical microbiology plays a key role in the twenty-first century in optimizing the management of infectious diseases. This role is possible by adoption of new technologies including real-time PCR, peptide nucleic acid fluorescent *in situ* hybridization (PNA-FISH), matrix assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF) mass spectroscopy (MS). Real time PCR method has revolutionized in the laboratories of clinical microbiology to diagnose different microbial infections and it is effective method for identification and quantification of mRNA. The real-time PCR method combined with PCR chemistry and fluorescent probe detection of the product. The detection of microorganism in this method is completed within an hour. PNA-FISH method novel diagnostic technique and was approved by U.S. Food and drug administration. It is used for the detection of yeast and bacterial species from the positive blood culture bottles. This method utilizes the hybridization of PNA probes to organism specific rRNA with detection through fluorescent microscopy. It is an ideal technique for microorganism quantification, visualisation of microbial community and analysis of three dimensional spatial distributions of cells. In mass spectroscopy MALDI-TOF mass spectroscopy has emerged as a potential method for identification and diagnosis of microbial infections, detection of food and water borne diseases, detection of biological epidemiological studies, detection of urinary and blood infections and detection of antibiotic resistance. It is a sensitive, rapid and low cost method. In MALDI-TOF MS method, the sample is mixing with a solution of an energy adsorbent, organic compound called matrix for analysis. So the sample entrapped within the matrix when the matrix drying. The sample within the matrix is ionized with a laser beam. In the samples it generates singly protonated ions. These protonated ions are then accelerated at fixed potential, these are separate from each other on the basis of their mass-charge ratio. Then these charged analytes detected and measured by using different types of mass analyzers like ion trap analyzers, quadrupole mass analyzers, TOF analyzers. Various new technologies being developed for the detection of microorganisms in clinical science and their advantages over conventional methods will be discussed during presentation.

Evaluation of Processed *Jatropha curcas* cake as food supplement on catfish (*Clarias gariepinus*)

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Jatropha curcas seed cake was processed using different methods of detoxification treatments (Hexane extraction + 95% ethanol extraction+ Autoclaving; 2% sodium hydroxide; 92% ethanol extraction + Autoclaving; 2% sodium hydroxide + days fermentation).the proximate composition and antinutrient of the untreated and treated *Jatropha curcas* cake were determined. The crude protein (CP) content of the untreated *Jatropha curcas* cake was $10.12 \pm 0.012\text{g}/100\text{g}$ while (Ethanol + Autoclaving) showed reduction of $8.16 \pm 0.02\text{g}/100\text{g}$ (Hex+Autoclaving+Ethanol); (2% NaOH) and (NaOH+ fermentation) showed increased in protein contents of $10.16 \pm 0.01\text{g}/100\text{g}$, $12.62 \pm 0.02\text{g}/100\text{g}$, $12.81 \pm 0.01\text{g}/100\text{g}$ respectively. Lipid content were $9.15 \pm 0.02\text{g}/100\text{g}$, $5.81 \pm 0.01\text{g}/100\text{g}$, $4.13 \pm 0.01\text{g}/100\text{g}$, $3.14 \pm 0.01\text{g}/100\text{g}$, $3.72 \pm 0.02\text{g}/100\text{g}$, $3.67 \pm 0.02\text{g}/100\text{g}$ (Control; Ethanol+Autoclaving; Hex+Autoclaving+Ethanol; NaOH; NaOH+fermentation) respectively. The antinutrient values were reduced more in the solvent treatments than the chemical treatment with Ethanol+Autoclaving causing the highest reduction in antinutrient levels compared to other treatments. Fish (*Clarias gariepinus*) divided into groups of 20 each were fed processed *Jatropha curcas* supplemented diets at a rate of 0, 5%, 10%, 20% respectively, with biweekly monitoring. All fish on 20% *Jatropha curcas* supplemented died within 24days irrespective of the processing method. After 56days, the average weight gain was $82.35 \pm 0.74\text{g}$ (Control feed), $25.00 \pm 1.33\text{g}$ (92%Ethanol+ Autoclaving), $20.49 \pm 1.07\text{g}$ (2%Sodium hydroxide+fermentation), $15.62 \pm 0.63\text{g}$ (Hexane+ 95% Ethanol+Autoclaving) and (2% Sodium hydroxide). These findings suggest that processing with 92% ethanol prior to autoclaving is the best method for detoxifying *Jatropha curcas* cake utilized in fish feed.

KEYWORDS: Supplement, Catfish (*Clarias gariepinus*), *Jatropha curcas*



**TOXICITY EVALUATION AND BEHAVIORAL RESPONSES OF
AFIDOPYROPEN ON EXPOSURE TO FRESHWATER EDIBLE FISH, *Cyprinus
carpio* (LINNAEUS)**

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Afidopyropen is a semi synthetically derived insecticide, it is used for broad range of row crops, such as cotton, soybeans and wheat; specialty crops, including citrus, pome fruit, stone fruit, tree nuts, leafy and fruiting vegetables, brassica, cucurbits, tuberous and corm vegetables as well as ornamental plants. Afidopyropen is very toxic to fish and other aquatic organisms. It is necessary to investigate toxic potentials of Afidopyropen to the fish. The objective of this study was investigated behavioral effects of Afidopyropen on *Cyprinus carpio* (Linn), one of the most commercially important freshwater fish. Fingerlings were exposed to different concentrations of an Afidopyropen 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6 for 96 h to evaluate acute toxicity (LC₅₀) by semi-static bioassay test. And it was found to be 1 mg/L. This study was to comprehend the connection among mortality and anomalous behavioral response. The fish showed remarkable behavioural abnormalities including erratic swimming movements, hyperactivity, faster opercular movement, rapid jerking movements, swirling movement and, surfacing to gulp air, burst swimming, loss of equilibrium shrinking to the bottom, secretion of more mucus, which might due to the interaction of AchE activity which remarks in excess accumulation of acetylcholine in cholinergic synapse leading to hyperstimulation. The result of the present study revealed that Afidopyropen is toxic to fish *Cyprinus carpio*. Therefore, its indiscriminate use can be contributing to decrease the papulation and its productivity in natural water bodies.

KEYWORDS : Afidopyropen, Toxicity, Behavioral changes, *Cyprinus carpio*, Bio assay.



EPP 65

Bioluminescence

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Bioluminescence is the production and emission of light by a living organism as the result of a chemical reaction during which a chemical energy converted to light energy. Bioluminescent organisms have luciferin compound, when luciferin combine with oxygen in the presence of luciferase enzyme then it produce oxyluciferin which emit light. Bioluminescent organisms are from microscopic cell to fish even shark but no higher vertebrate above the fish produce light. 90% of bioluminescent organisms are found in Ocean, some found in terrestrial habit and fresh water. Some of bioluminescent organisms are bacteria, fungi, algae, insect etc. These organisms are use their light for defence, feeding, communication, mate etc.

EPP 66

Growth performance, lipid content of egg yolk and haematological profile of laying birds fed *Aframomum melegueta* seed meal

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Antibiotics are used as feed additives in livestock production to improve the growth performance of animals. However, when not properly used, antibiotic residues can remain in animal products and can be of health hazard to the consumer. Hence, there has been an unprecedented growth in the use of medicinal plant extracts in the poultry and livestock sector. The 10-weeks study assessed the growth performance, egg yolk lipid content and haematological profile of laying birds fed *Aframomum melegueta* (grain of paradise) seed meal. A total number of 96 birds was used, birds in treatment 1 were fed a control diet while birds in treatments 2, 3, and 4 were fed diets containing *Aframomum melegueta* seed meal (AFSM) at inclusion rates of 0.2%,

0.4%, and 0.6% of total feed (on dry matter basis) respectively. The phytochemical screening of AFSM shows the presence of the following phytonutrients: alkaloid, saponin, tannin, anthraquinone, terpenoid and cardiac glycosides. The initial weight (g), final weight (g), Weight change (g) and Feed intake per bird (g) were not significantly different ($p \geq 0.05$) across all treatments. The Feed conversion ratio (FCR) for treatment 2 was significantly lower ($p \leq 0.05$) than the FCR for the other treatments. Lipid evaluation, total cholesterol, triglycerides, Low-Density Lipoprotein (LDL) and High-Density Lipoprotein (HDL) of the egg yolk of test subjects were analyzed. The inclusion of AFSM significantly ($p \leq 0.05$) increased the total cholesterol ($\text{mg}100\text{g}^{-1}$), LDL and HDL content of the egg yolk. Triglycerides ($\text{mg}100\text{g}^{-1}$) ranged from 1711.05 $\text{mg}100\text{g}^{-1}$ in treatment 2 to 1834.55 $\text{mg}100\text{g}^{-1}$ in treatment 4. The haematological parameters showed no significant differences ($p \geq 0.05$) except for the eosinophils of birds fed 0.2% AFSM when compared to all other treatments. This study revealed that phytogenic additives can improve overall growth performance, as well as improve health status, using the haematological indices, therefore promoting food security.

EPP 67

PHYTOCHEMICAL SCREENING AND ANTIMICROBIAL PROPERTIES OF A LIPOPHILIC FRACTION AND KAURENOIC ACID ISOLATED FROM *ANNONA SENEGALENSIS* LEAVES EXTRACTS (African Custard Apple)

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The constant utilization of plants for food and medicine has necessitated the exploration on the commonly consumed plants for human health. This study investigated the phytochemicals constituents, antimicrobial properties of a lipophilic fraction and kaurenoic acid extracted from the leaves of *Annona senegalensis*. The preliminary phytochemical screening of the methanolic extract of *Annona senegalensis* leaves showed the presence of six (6) different secondary metabolites. The crude methanol extract was partitioned between aqueous methanol and, chloroform, chloroform and ethyl acetate, chloroform and acetone. All the fractions were evaporated to obtain A1, A2, A3 and A4

respectively. The methanol fraction (A1) which yielded a lipophilic oily liquid, also indicated strong activity in the antimicrobial test compared to other fractions, based on these results, the methanol fraction was subjected to activity guided chromatographic purification targeting the compound responsible for the observed activity. The methanol fraction (A1) (10 g) of the leaves of *Annona senegalensis* was chromatographed on silica gel column, using different eluents affording 117 fractions which were combined based on their TLC pattern. The analysis afforded pooled fraction (62 – 67) which was further chromatographed to obtain the bioactive compounds. The structure of the compound was characterized using FTIR, ^1H NMR, ^{13}C NMR, COSY, DEPT and MS spectroscopic techniques. The proposed structure of the compound is a straight chain aliphatic dicarboxylic acid (3-methylnonadec-4,6-diene-1,19-dioic acid). The results of the MIC of the acid against *B. subtilis*, *S. aureus* and *P. aeruginosa* were 160, 40, and 34 $\mu\text{g/mL}$ respectively. Therefore, kaurenoic acid and the lipophilic fraction from *A. senegalensis* leaves exhibited potent antibacterial activity.

Keywords: *Annona senegalensis*, lipophilic, kaurenoic acid, extracts, metabolites, leaves, phytochemical

EPP 68

Health benefits of *Syzygium aqueum*

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This article attempts to explore the dietary usefulness of Watery Rose Apple fruits (*Syzygium aqueum*). Consumption of fruits has become a better means of living a healthy life which contains essential bioactive compounds. Now a days, fruits and plant products have become a vital part of scientific research, mostly in pharmaceutical industries. Commercial plantations of Water Apple are rare in India. Watery Apple is one such fruit, getting attention in Indian fruit markets, due to increased focus on health and nutrition. Water Apple is mainly consumed fresh due to its thirst-relieving character, owing to its high-water

content. It is small to medium sized tree, growing up to height of about 8-10 meters with branching near the base. Flowers are yellowish white or pinkish in colour. Flowering occurs in February - March and fruits mature during May - June. Fruits are small, bell or pear-shaped with shiny skin, spongy, watery, slightly fragrant, sweet-acidic with 2 - 6 seeds and white, pinkish or red in colour. There are two types, one white in colour and the other is red or pale-pink colour. It is propagated by seeds, by budding and air-layering. Fruits, leaves and bark of this plant has many medicinal benefits. It can be used as remedy for most of the diseases like diabetes, cancers, etc.

Key words: *Syzygium aqueum*, Bioactive compounds, diabetes, Cancer.

EPP 69

Characterization of *Cronobacter sakazakii* ST types linked with neonatal infections

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Background: *Cronobacter* spp (*C. Sakazakii* and *C. malonaticus*) are important pathogens commonly associated with powdered infant formular (PIF). *C. sakazakii* predominantly the ST4 group causes rare but life-threatening infections such as meningitis, necrotizing enterocolitis and septicaemia especially in neonates due to the consumption of an unsterile PIF. However, the pathogenicity and virulence of *C. sakazakii* are not fully understood. This study aimed to characterize the ST4 and non-ST4 types among 8 *C. sakazakii* isolates obtained from difference sources by studying the differences in various physiological traits that contribute to their persistence in the environment.

Methodology: Physiological assays such as capsule formation, desiccation tolerance, heat tolerance, and haemolysis were carried out by standard procedures while their antimicrobial susceptibility to 6 classes of antibiotics were performed by disk diffusion method. Comparative genomics study was carried out to investigate the presence or absence of genes related to physiological traits using web bioinformatics tools.

Results: The capsule formation assay revealed that most *C. sakazakii* strains produced leathery or mucoid capsules in varying degrees while, the desiccation

tolerance assay indicated all tested *C. sakazakii* strain irrespective of the sequence type were desiccation-tolerant. A relationship was observed between desiccation and capsule formation as all strains that produced capsule were desiccation-tolerant. All the investigated strains were resistant to tetracycline and vancomycin. The genomic search conducted to investigate the presence of previously identified virulence-related genes in the genome of the study strains revealed that most of *C. sakazakii* isolates had the genes, therefore we could not determine the significant difference in the virulence potentials between the ST4 and non-ST4 *C. sakazakii* strains.

Conclusion: Further studies are required to determine which genes are exclusively expressed in ST4 groups, thus contributing to predominance in neonatal infection. The gene expression study may be useful in designing drug targeting this species.

Keywords: *Cronobacter sakazakii*, Neonates, pathogens, virulence

EPP 70

Isolation and Characterization of *Opisthacanthus capensis* (Black Creeping Scorpion) Venom Phospholipase A2 and inhibitory effect of aqueous leaves extract of *Annona senegalensis* on the enzyme

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Scorpion stings are global health distressing matter, inflammation, pulmonary edema and deaths in children occur in severe cases due to some scorpion's envenomation. *Opisthacanthus capensis* venom phospholipase A2 (PLA2) was isolated and characterized, the PLA2 activity was determined by a modification egg yolk coagulation method of Haberman and Neumann, and hence the inhibitory effect of the leaves aqueous extract of *Annona senegalensis* on PLA2 was studied by the assay protocol. The PLA2 had an optimum pH and temperature of 6 and 60°C respectively. The Km and Vmax of PLA2 were found to be 1.67mM and 0.00014μmol/min respectively, with activation energy of 3565.1cal/mol. Aqueous extract of *Annona senegalensis* at different concentrations inhibited phospholipase A2 activity exhibiting classical competitive inhibition. Therefore, *Annona senegalensis* can contribute in neutralizing *Opisthacanthus capensis* venom PLA2 activity.



Keywords: *Opisthacanthus capensis*, *Annona senegalensis*, phospholipase A2, Envenomation

EPP 71

**ANTIBIOTIC RESISTANCE PATTERN OF *Staphylococcus aureus*
ASSOCIATED WITH NOSOCOMIAL INFECTION IN WUDIL GENERAL
HOSPITAL**

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Antibiotics are specific chemical compounds produced by microorganisms that can destroy or inhibit the life processes or growth of other microorganisms. Hospital acquired infection is one of the leading cause of death. Health care workers are constantly exposed to potentially infectious material, therefore capable of transmitting disease to patients. In Nigeria inadequate knowledge of the risks of hospital acquired infection and the measures of risk reduction have limited control activities. The present study was aimed to determine the antibiotic resistance pattern of *Staphylococcus aureus* associated with nosocomial infection in Wudil General Hospital. Gram staining and biochemical tests were carried out for proper identification of the isolates. Twenty isolates 20(100%) were collected, out of which 17(85%) isolates shows positive result. Results obtained shows that Palms of health care workers is the most frequent mode of transmission of nosocomial infection. The 17(85%) isolates were tested for their antibiotic resistance pattern. *Staphylococcus aureus* shows resistance to amoxicillin 2(10%) and cefuroxime 3(15%) antibiotics. Ciprofloxacin (10µg) was susceptible to the pathogen 18(90%). Disinfecting of fomites and proper hand washing while handling patients should be employed to reduce the cause of infection. Drugs should be administered in optimum dose, frequency and by appropriate route(s) to avoid drug resistance.



**Sensory Properties and Microbial evaluation of African Yam Bean Protein
Isolate fortified Apula**

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Investigation was carried out on Apula, a milled roasted maize, produced from yellow variety of maize, supplemented with African Yam Bean protein isolate (AYBP) at various ratio (maize/AYBP: 100:0%, 70:30%, 60:40%, 50:50%). The 100% Apula served as the control. Sensory and microbial analysis was carried out according to standard method. Sensory evaluation result showed that all Apula samples had high rating for all evaluated attributes except for colour and overall acceptability. The 30% AYBP supplementation compared favourably with the control. The best sample was further compared microbiologically with the control. The microbiological result showed that supplementation would significantly extend the shelf life of Apula. There was more microbiological proliferation on the control than sample 70:30%. However, both samples showed no significant difference ($P \leq 0.05$) in the yeast/mold count after 28 weeks of storage. The sample 70:30% Apula/AYBP blend would be an acceptable and marketable formulation that would stay fairly longer on the shelf.



Application of Biotechnology in Agriculture

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Biotechnology is a broad area of biology, involving the use of living systems and organisms to develop or make products. Depending on the tools and applications, it often overlaps with related scientific fields. New agriculture technologies, in general, need to cover two societal requirements-ensuring a safe, nutritious, and affordable food supply for the rapid increasing population, and at the same time, minimizing the negative environmental impacts of food production itself. Current agricultural technologies such as plant breeding and agrochemical research and development (R and D), environmentally sensitive and economic farm management practices will continue to play a major role in assuring a plentiful and safe food supply. Advances in all these areas will be required to meet world food productions needs.

Plant biotechnology complements plant breeding efforts by increasing the diversity of genes and germplasm available for incorporation into crops and by significantly shortening the time requires for the production of new cultivators, varieties and hybrids. From an economic perspective, plant biotechnology offers significant potential for the seed, agrochemical, food processing and pharmaceutical industries to develop new products and manufacturing processes. Perhaps the most compelling attribute of the application of biotechnology to agriculture is its relevance to helping ensure the availability of environmentally sustainable supplies of safe, nutritious and affordable food and to providing a readily accessible, economically viable technology for addressing primary food production needs.

Key words: Biotechnology, Agriculture, Crop Productivity, Genes and Germplasm.

MUTATIONS FROM AFRICA’S SARS-CoV-2 GENOME A LEAD TO A NOVEL VACCINE

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The world is overwhelmed! This type of incidence will never be forgotten” it started in December when pneumonia-like symptoms was identified in Wuhan, China. The culprit was identified as beta-corona virus. The virus was named by WHO as SARS-CoV-2. SARS-CoV-2 is a positive strand RNA virus; the SARS-CoV-2 genome is made up of approximately 29,700 nucleotides. This comprises of a long ORF1ab polyprotein at the 5’ end, which encodes 16 non-structural proteins. And 3’ end encodes 4 major structural proteins including: the spike (S) protein, nucleocapsid (N) protein, membrane (M) protein and the envelope (E) protein. The disaster caused by Covid19 disease can’t be over emphasized; it is spreading fast across the whole world. More than 33 million confirmed cases have been recorded across the globe. But interestingly Africa’s covid19 cases have been on the decline since the month of July and 80% of the recorded cases are asymptomatic compared to the other continents. This poses lots of questions; What is making Africans thick in the skin against this virus? inference have been made to socio-ecological factors and hot-humid nature of the climate. But this can only be proven by the genomic make-up of the of complete sequence of the SARS-CoV-2 of the African populace. Mutations have been reported in the spike protein encoding gene of the SARS-CoV-2 in some regions of Africa through sequence alignment with sequence of SARS-CoV-2 isolated from Wuhan as the query. Keeping in mind that the spike protein plays a very important role in the transmission of the disease, through the binding of its spike to angiotensin converting enzyme (ACE2) receptor at the surface of human cells. By the application of bioinformatic tools the site of mutations in the genome this will give possible insight on epitopes of t-cells which will show binding affinity to human leucocyte antigen (HLAs) of the Africans population which will in turn induce immune responses. Thus this review is an eye opener to make cognizance the potentials of the T-cells epitopes at the location of mutations in the genome of the SARS-CoV-2 from Africa. these could be the answer to eradicate the virus entirely from the globe, through the development of a novel vaccine.

Keywords: SARS-CoV-2, Spike protein, mutation, Epitopes, Bioinformatic tools.



Chemical, Nutritional and Biochemical Assessment of a blend of Selected Spices on some Tissues of Wistar Rats

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Background: Spices are single or blends of aromatic and pungent herbal substances which gives characteristic taste, flavour, colour and aroma to foods and have been proposed to have dietary importance. Therefore, the aim of the study is to investigate the chemical and nutritional properties of a blend of selected spices and biochemical interactions in the serum and bone of rats.

Materials and Methods: Proximate and mineral analysis as well as phytochemical constituents were determined on a blend of eleven spices using standard procedures. Meal-based diet of the spices were formulated into seven groups – A – G. Group A served as control diet while B – E were supplemented with 20%, 40%, 60%, 80% of the spices respectively while groups F and G were of 100% blended and standard spice respectively. Rats were fed for eight weeks and feed intake, body weight gain, protein efficiency ratio, body mass index, serum vitamin C, pepsin and iodine and alkaline phosphatase activity in the bone and serum were determined using standard methods.

Results and Conclusion: The spices contain, a high contents of fibre, proteins and lipids as well as Alkaloids, Terpenoids, Steroids, Glycoside and Triterpenes. Calcium, Iron, Magnesium, Manganese, Copper, Zinc and Cobalt were also detected. The results of nutritional and biochemical analyses revealed a significant increase when compared with the control diet but compared favourably with the standard diet. This implies that the blend of spices was able to boost the nutritional status of the rats; an indication of bioavailable nutritional agents.

Keywords: Spices, Serum, Nutritional, Diet, Biochemical



**Improvement of Iron (Fe²⁺) overload in Flax germinating seedlings by
exogenous application of salicylic acid and nitric oxide**

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Iron is an essential component for life and a co-factor for many enzymes. Lipoxygenase are a group of enzymes that metabolize poly unsaturated fatty acids contains non-heme iron as a co-factor. Iron is very important for photosynthesis and chlorophyll synthesis in plants. Low levels of iron in soil results plant growth retardation and higher levels of iron is toxic to cell through generating free radicals which in turn damage cellular proteins, lipids and DNA. In this study we investigated the effect of salicylic acid (SA) and sodium nitroprusside (SNP; NO donor) on iron (Fe²⁺) toxicity in germinating Flax germinating seedlings. In this pilot study 5 day old flax seedling plants were subjected to 0.5 mmol L⁻¹ (in the form of FeSO₄.7 H₂O) overload and treated with 0.2 mmol L⁻¹ salicylic acid and 0.2 mmol L⁻¹ sodium nitroprusside to lessen the toxic effect of Fe²⁺. The Fe²⁺ overload led to high accumulation in roots of growing plants compared to shoots, causing oxidative stress. Exogenous addition of either 0.2 mmol L⁻¹ SA or 0.2 mmol L⁻¹ SNP reduced the toxic effect of Fe²⁺, and supplementation with both SA and SNP significantly reduced the toxic effect of Fe²⁺ by induction of lipoxygenase activity, increase in levels of proline, O₂^{•-} radical, MDA, and H₂O₂, and reduction in the activity of antioxidant enzymes such as CAT, SOD and APX in shoots and roots. Exogenous application of SA or SNP, specifically the combination of SA+SNP, protects Flax seedlings from oxidative stress observed under iron treatment.



Lipoxygenases: Their Role in Plant Physiology

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Several enzymes play a key role in plant growth and development. Among these, lipoxygenases family of enzymes are important. Lipoxygenases are a ubiquitous family of non-heme iron enzymes widely distributed in plants, initiate hydroperoxidation of polyunsaturated fatty acids (PUFA) containing *cis*, *cis*-1,4-pentadiene moieties, and produce phytooxylipins. Oxylipins including green leaf volatiles and hormone jasmonic acid play a significant role in physiological processes, seed germination, fruit ripening, and senescence. Detailed studies have shown that LOX and its products accumulate transiently upon developmental or environmental stimuli. LOXs play a key role in defense responses against biotic and abiotic environmental stresses such as fungi, bacteria, virus, nematodes, birds, insects, and rodents. As a result, these enzymes are the natural topics of study when scientists investigate plant response to stresses.



EPP 78

Biofuels – future of the energy

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Biofuel, any fuel that is derived from biomass—that is, plant or algae material or animal waste. Since such feedstock material can be replenished readily, biofuel is considered to be a source of renewable energy, unlike fossil fuels such as petroleum, coal, and natural gas. Biofuel is commonly advocated as a cost-effective and environmentally benign alternative to petroleum and other fossil fuels. Ethanol, biogas, biodiesel, syngas, bio alcohols, green oils, bio ethers, straight vegetable oil are examples of biofuels-called "drop-in" biofuels can be defined as "liquid bio-hydrocarbons that are functionally equivalent to petroleum fuels and are fully compatible with existing petroleum infrastructure. Some examples of drop-in biofuels include bio butanol, biodiesel, synthetic paraffinic kerosene, and other synthetic fuels. Bio fuels like ethanol and bio diesel are renewable resources low cost and eco-friendly products. Bio fuels are the future of the energy in this India and around the world.

EPP 79

Bio Energy

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BECCS is a technology that integrate biomass system with geological Carbon storage. During combustion, fermentation, bio degradation and other biological processes large amount of carbon dioxide is limited from trees plants and agriculture crops. To prevent the release of large quantities of carbon dioxide into the atmosphere forms heavy industries. The BECCS technology was first mentioned in in scientific publications in 1990. BECCS technologies where use ``fossil fueled power plants, oil and gas fields and on industrial facilities BECCS technologies contribute maintaining the use of Carbon. Intensive energy Means of production by making them less harmful to the environment. BECCS has also been linked with damaging the environment due to leakage of carbon dioxide from the pipelines of storage. BECCS could greatly reduced green house gas emissions, allowing utilities to keep using abundant and efficient fossil fuels to generate reliable and power.



BIOMASS – PROS AND CONS

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Biomass is always and widely available as a renewable source of energy. The organic used to produce biomass are infinite, since our society consistently produces waste such as garbage, wood and manure. It is carbon neutral. As a natural part of photosynthesis, biomass fuels only release the same amount of carbon into the atmosphere as was absorbed by plants in the course of their life cycle. It reduces the over reliance of fossil fuels. Not only there is a limited supply of fossil fuels but fossil fuels come with environmental baggage, including the release of large amounts of carbon dioxide (co₂) into the atmosphere and the pollutants that result from removal, transportation and production is less expensive than fossil fuels. While fossil fuel production requires a heavy outlay of capital, such as oil drills, gas pipelines and able to generate higher profits from a lower output. Biomass production adds a revenue source for manufacturers. Producers of waste can add value by channeling their garbage to create a more profitable use in the form biomass energy, less garbage in landfills. By burning solid waste, the amount of garbage dumped in landfills is reduced by 60 to 90 percent and reduces the cost of landfill disposal and amount of land required for landfill. While the advantages of biomass energy are plenty, there are also some shortcomings, including: Biomass energy is not as efficient as fossil fuels. Some biofuels, like Ethanol, is relatively inefficient as compared to gasoline. In fact, it has to be fortified with fossil fuels to increase its efficiency. It is not entirely clean. While biomass is carbon neutral, the use of animal and human waste escalates the amount of methane gases, which are also damaging to the environment. Additionally, the pollution created from burning wood and other natural materials can be considered just as bad as that resulting from burning coal and other types of energy of energy resources.

KEY POINTS: garbage, landfill, disposal, biomass, pollution, burning coal.



Properties of Titania based Catalyst towards the Reduction of Propanoic Acid Present in Bio-oil

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Bio-oil in its raw form has limited application as petrofuel due to the presence of highly oxygenated hydrocarbons such as carboxylic acids. These acids are the primary source of corrosion of vessels and pipework in refineries, in addition to chemical instability. The content of oxygen content can be minimized through the hydrogenation of carboxylic acids into valuable fuels such as alcohols. In this study, the hydrogenation of propanoic acid typical of short chain carboxylic acids present in bio-oil is investigated using prepared 4% Pt/TiO₂ catalyst. The hydrogenation reactions were evaluated over ranges of temperature 125-200 °C and reaction time 0.5-4 h, with the aim of enhancing the selectivity of propanol. The prepared catalyst was characterized using Brunauer–Emmett–Teller (BET), H₂-Temperature Programmed Reduction (H₂-TPR) and Energy Dispersive X-ray (EDX). Catalyst stability was probed by the recovery and regeneration of spent catalyst over three cycles. BET analysis showed features of Type IV isotherm with Type 3 hysteresis for 4% Pt/TiO₂. H₂-TPR showed features of bimodal peaks in the temperature ranges of 6 – 140 °C and 430 – 650 °C. The hydrogenation of propanoic acid over temperature showed that as temperature increases from 125 °C to 200 °C propanol selectivity decreases from 83% to 45% while propyl propionate selectivity increases from 17% to 55%. A similar trend was observed as time increases from 0.5 h to 4 h. Catalyst reusability showed <4% drop in propanol selectivity over three consecutive cycles confirming the stability of 4% Pt/TiO₂. Overall, 4% Pt/TiO₂ catalyst favours higher propanol selectivity at low temperature.

Keywords: Bio-oil, Hydrogenation, Carboxylic acids, Propanoic acid



Acrylamide contamination in foods: impact on health

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Food delivers all the nutrients necessary for the survival of an organism. Unfortunately, food also often becomes a source of many harmful chemicals. Acrylamide, a ‘type 2 alkene’ is produced in food by Maillard reaction through high temperature thermal processing like frying and roasting. It is reported to induce oxidative stress and cause genotoxicity, neurotoxicity and carcinogenicity. Many studies have been carried out for quantifying the levels of acrylamide in various foods of western origin. The levels of acrylamide in Indian snacks are not well documented. The present study is an effort to characterise the favourite Indian street snack golgappa and investigate its acrylamide content. The qualitative and quantitative analysis of golgappa established the presence and amounts of ash, moisture carbohydrate, protein and lipids. The level of acrylamide in food sample was analysed using LC-MS. The amount of acrylamide in experimental food sample was found to be in detectable amounts. The production of acrylamide in the food sample may be attributed to the deep frying process and the presence of protein, carbohydrate and lipids. This study concludes that, the most ardently consumed cheaply available golgappa contains considerable amounts of acrylamide and continuous consumption of golgappa may prove detrimental to health.

PLANT GROWTH REGULATORS AND APPLICATIONS

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Plants require light, water, oxygen, minerals and other nutrients for their growth and development. Apart from these external requirements, plants also depend on certain organic compounds to signal, regulate and control the growth of plants. These are collectively called as Plant Growth Regulators or Plant Growth Hormones. Plant growth regulators (PGRs) are chemicals used to modify plant growth such as increasing branching, suppressing shoot growth, increasing return bloom, removing excess fruit, or altering fruit maturity. There are different types of Plant Growth Regulators, which are also referred to as phytohormones. Phytohormones are organic compounds which are either synthesized in laboratories or produced naturally within the plants. They profoundly control and modify the physiological processes like the growth, development, and movement of plants. They are different types of plant growth regulators like Auxins, Gibberellins, Cytokinins, Absciscic acid and Ethylene. Based on their actions, plant growth regulators are broadly classified into two major groups: Plant growth promoters and Plant growth inhibitors. Auxins, Gibberellins, and Cytokinins are grouped into Plant growth promoters while Absciscic acid is grouped into Plant growth inhibitors whereas Ethylene can be grouped either into the promoters or into the plant inhibitors. The initial steps of the discovery of major Plant growth regulators began with Charles Darwin and his son, Francis Darwin. Plants growth hormones or plant growth regulators exhibit the following characteristics: Differentiation and elongation of cells, Formation of leaves, flowers, and stems, wilting of leaves, ripening of fruit and Seed dormancy. Modification of plant hormone biosynthesis through the introduction of bacterial genes is a natural form of genetic engineering, which has been exploited in numerous studies on hormone function. Recently, biosynthetic pathways have been largely elucidated for most of the plant hormone classes, and genes encoding many of the enzymes have been cloned. These advances offer new opportunities to manipulate hormone content in order to study their mode of action and the regulation of their biosynthesis. Furthermore, this technology is providing the means to introduce agriculturally useful traits into crops.

KEYWORDS: Plant growth regulators, Auxins, Gibberellins, Cytokinins and Genetic Engineering.



Fish parasites of Zoonotic importance and their implications in food safety and food security

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Fishes have become basic as food, lure and friend creatures. Fish and fish items from both catch fishery and aquaculture ventures are the modest wellspring of proteins everywhere in the world. Our food safety and security is consistently in question by a several factors including zoonotic parasitic infections inspite of numerous mechanical progressions encouraged to improve the wild catch fishery and aquaculture production. Fishery items contaminated by zoonotic parasites are one of the significant worries to food safety. The diseases with the nematode *Anisakis* in marine fishes and cephalopods causing Human anisakiasis or potentially sensitivity related wellbeing hazards; the nematode *Gnathostoma* causing Gnathostomiasis; the digenean *Clonorchis sinensis* causing Clonorchiasis; *Opisthorchis viverrini* causing Opisthorchiasis; *Fasciola hepatica* and *F. gigantica* causing Fascioliasis; cestode *Diphyllobothrium latum* causing Diphyllobothriasis and food contamination due to the myxozoan disease of the family *Kudoa* are serious zoonotic diseases. At the same time, the irrepressible human population growth, declining fish catch from the wild, deprivation of aquatic environment, and dilapidated growth of aquaculture sector due to parasitic diseases are added factors posing a serious global threat to the security and sustainability of fish products. The wild fish populations are exaggerated by the parasitic diseases that directly and indirectly affect fish growth, reproduction and survival, whereas intensified aquaculture operations cause fish health problems related to parasitic diseases ensuing to decline in production. The utilization of these parasites for legitimate administration of fishery assets can be of help in tending to food safety, fish security, and food sustainability, while simultaneously dealing with our fishery resources. As we are tending to these worldwide issues, these parasites that we are thinking about as dangers can be of helpful incentive to accomplish supportable turn of events.

Keywords: Zoonotic parasites of fish, Food safety, Food security.



A Biochemical study on the levels of antioxidant, Hormones and haematological parameters in young women with polycystic ovarian syndrome

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PCOS is a common endocrine disorder occurring in young women between the age group of 18-22. It is a disease not only showing intensive effect on the reproductive health of teen women but also affect their biochemical parameters. The cause is unknown it can be due to the increased level of male hormones which prevents the ovaries from producing hormones and making eggs normally. Recent researches said in some cases PCOS likely results from here from a combination of causes which includes genetic and environmental factors. Screening for PCOS has to be done among Young women at the age of 18 to 22 to analyse the levels of various biochemical parameters and to estimate the levels for better diagnosis. Various methodology methodologies can be used to estimate antioxidant(lipid peroxide and glutathione), thyroid hormone(Microparticle enzyme immunoassay and Chemi-luminescence immunoassay), hormones (Elisa method), insulin (FPG or A1c test) hematological (blood test kit).Finally results are expressed in the form of significant value ("p"-values intensity of biochemical parameters). Based on the prevalence of these parameters several treatment options are available for women with women with infertility, anovulation related to PCOS. Recent studies do not support for the intake of drugs for routine use such as metformin, hormone tablets for period regulation, contraceptive and hormonal with Vitamin, meprate etc., in this disease. So lifestyle modification and dietary management are encourage over treatment because by these parameters- obese condition and dietary patterns were the main causative for PCOS



**BIODEGRADATION OF BANANA (*Musa sapientum*) PEELS AND
PRODUCTION OF CITRIC ACID USING SOME STRAINS OF *ASPERGILLUS
NIGER***

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The use of *Aspergillus niger* strains (NRRL 567; *A. niger* ATCC 1526 and *A. niger* SI 2003) for the degradation of banana (*Musa sapientum*) peels for citric acid (3-carboxy-3-hydroxypentanedioic acid) production was investigated using Solid State Fermentation (SSF) process. Carbon dioxide production method was used to monitor the degradation process. *A. niger* NRRL 567 had the highest degradation capacity on banana peels based on the observed cumulative CO₂ production at 3% Methanol concentration with optimum citric acid of 70.05±0.09g/kg of the substrate used representing a yield of 62.99%(w/w). THIS WAS followed by *A. niger* ATCC 1526 with optimum citric acid production of 60.10±0.22 g/kg of the substrate used representing a yield of 54.98% (W/W). *A. niger* SI 2003 had the least degradation capacity with optimum production of 54.30±0.53g/kg of the substrate used representing a yield of 49.18% (w/w). The high level of CO₂ production, citric acid yield and reduction in reducing sugar with the fermentation period observed by *A. niger* NRRL 567 suggest the strain as a good degrader and therefore the best citric acid producer from banana peels amongst the *Aspergillus* species used.

KEY: Biodegradation Banana Peels, Citric Acid Production, *Aspergillus niger* strains



EPP 87

**Activity levels of ammonia and urea in *Labeo rohita* exposed to
deltamethrin**

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In the present investigation freshwater fish *Lebio rohita* exposed to Deltamethrin in lethal 1, 4 days and sublethal concentration 1, 4 and 8 days to estimate activity levels of ammonia and urea in different tissue like gill, liver and muscle. The shift in the ammonia and urea level was of greater magnitude in lethal concentration of Deltamethrin. Where as in sublethal concentration the activity of ammonia among the tissues, decrement was maximum in gill (-54.3) followed by liver (-45.2) and muscle (-44.8). Activity of urea was relatively less among the tissues, increment was maximum in gill (+75.6) liver (+74.9) and muscle (+81.0) in lethal and sublethal concentrations of Deltamethrin. The increment was decreased with increasing exposure periods.

Key words : Ammonia, Urea, *rohita* and Deltamethrin.

EPP 88

BIO SENSORS IN NANOTECHNOLOGY

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Nanotechnology is emerging technology increasingly playing important role in the development of biosensors. The sensitivity and performance of biosensors is being improved by using nanomaterials for their construction. A biosensor is a device incorporating a biological sensing element either intimately connected to or integrated within a transducer. The use of these nanomaterials has allowed the introduction of many new signal transduction technologies in biosensors. Because of their submicron dimensions, nanosensors, nanoprobe and other nanosystems have allowed simple and rapid analyses in vivo. Portable instruments capable of analyzing multiple components are becoming available. This work reviews the status of the various nanostructure-based biosensors.



Effect of air pollution on pollen viability

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Air pollution in our surrounding is increasing everyday due to urbanization and industrialization. In this report the effect of air pollution on vegetation was investigated. Polluted and non-polluted sites were chosen and comparative study was done on the climatic factors, level of pollution and their effects on vegetation of these areas. Plants found in the polluted area showed stunted growth, chlorosis and scars on stem and leaves. Mitosis, gas exchange, size and chemistry of pollen can also be influenced by air contaminants. Pollen germination and tube length differ in their response to air pollution stress. *Nicotinia plumbaginifolia* shows 47.36% of pollen germination at polluted area and 64.81% at non polluted area, *Bougainvillea* shows 43.33% of pollen germination at polluted area and 64% at non polluted area, *Vinca rosea* shows 55.76% of pollen germination at polluted area and 62.06% at non polluted area, *Amaranthus viridis* shows 47.27% of pollen germination at polluted area and 68.57% at non polluted area, *Nerium* shows 45% of pollen germination at polluted area and 65.51% at non polluted area. These were the effect of obnoxious gaseous elements which were found in elevated level in the polluted area. Pollen viability of the plants growing in the polluted area was lower than that of non-polluted site. This study portrays a clear view of adverse effects of air pollution on plants.

Keywords: Pollution, Pollen, Germination, Pollen tube



**Preparation and Optimization of Chrysin-Dendrimer Formulation for
Enhancement of Aqueous Solubility**

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Multiple anti-tumour products have been synthesized and marketed for improving chemotherapy module. However, chemically derived drug shows accumulative toxicity at non-targeted sites of healthy tissues. Therefore, plant-derived components with anticancer property emerged as a safe class of drugs. Despite finding of numerous anticancer phytomedicine, its practical utilization is rendered due to limited potency. One reason for less therapeutic efficacy of natural compounds is its poor aqueous solubility and stability in-vivo¹. Chrysin (CRY) belonging to the class of polyphenols, is an example of plant-derived anticancer agents. It is reported to inhibit tumour growth through inhibition of cell proliferation and induction of apoptosis in case of colon cancer and breast cancer. However, the potential of CRY is compromised due to low solubility in aqueous medium (<0.1 mg/mL), hence reduced bioavailability². Development of an anticancer drug delivery system for entrapping the hydrophobic CRY is an alternative to improve its solubility. Dendrimer is the example of water-soluble polymer and their ability to entrap hydrophobic molecules makes them good solubility enhancers. The dendrimer architecture has three main sites for drug entrapment (i) void spaces (ii) branching points and (iii) outside surface groups. We have used commercially available PAMAM dendrimer to entrap CRY and thus enhance its solubility³. Designing or selecting an appropriate dendrimer is the main step for drug entrapment. We have screened PAMAM available in different generations (G4, G4.5 and G5) with amine and carboxyl surfaces, for appropriate drug entrapment and maximum solubility enhancement. In this study, we have used different dendrimers concentration (0.05 to 0.4 mg/mL) for screening of CRY solubility at different pH (5.0, 7.0 and 9.0) via solvent evaporation method. The formulation with highest CRY solubility from set of different generations was lyophilized and used for further spectroscopic analysis. The prepared PAMAM-CRY complexes were characterized by FTIR, NMR and zeta potential measurements.

Keywords: Phytochemical, chrysin, dendrimer, solubility, optimization, PAMAM-CRY.



EPP 91

A Biochemical study on the levels of BMI, Liver profile, Lipid profile and Cardiac markers in the young women with PCOS (Polycystic Ovarian Syndrome)

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Polycystic ovarian syndrome is the most common endocrine disorder that affects women of reproductive age. PCOS is a leading cause of obesity, infertility, liver and cardiac issues. Hence a sample study was carried out to identify the percentage of PCOS affected individuals between 19 to 22. It was found that out of 1500 students 6% were found to have PCOS. Those individuals were grouped on the basis of a questionnaire and analysed for the levels of BMI, Cardiac markers like CRP LDL to HDL ratio and Lipid profile using their serum. Their liver profile was also analysed by estimating their serum SGOT, SGPT and GGT levels. The BMI was found to be highly significant (P-value is <0.01) in comparison with non PCOS individual of same age group. The levels of LDL and CRP were also found to be significant (P-value is <0.001). The other parameters were found to be non significant (P-value is <0.05).

Key words: LDL - Low density lipoprotein, HDL - High density lipoprotein, CRP - C reactive protein



Predictive novel biomolecules from endophyte source of a medicinal plant: *Solanum violaceum* L.

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Solanum violaceum L. is a shrub traditionally used as folk medicine. Pharmaceutical and scientific community has drawn attention towards medicinal plants due to immense medicinal properties. The development of pathogen resistance to available drugs increased the demand to search for new antimicrobial agents. Endophytes are now widely considered as a rich source of bioactive small molecules with potential use in medicine, agriculture and bioindustry. Fungal endophytes are ubiquitous and they represent rich diversity of secondary metabolites. In this study, a total of 12 endophytic fungi were obtained from ripe and unripe fruits of *Solanum violaceum* and were identified by morphological and molecular techniques. The endophytic fungi were tested with solvent extractions and cell free supernatants for their ability as antifungal agents against human pathogenic fungi, *Candida albicans* and *C. tropicalis*. Among the tested endophytes, SRF-2 and SRF-7 showed the potential activity against tested fungi with 13 ± 1 mm of zone of inhibition. When grown SRF-2 and *Candida albicans* together in dual plate assay, growth inhibition was noticed in pathogen, when compared with control plate, where only pathogen was grown. Our findings show that fungal endophytes have significant antagonistic activity against the selected pathogenic fungi. On the basis of above findings, the endophytes of *Solanum violaceum* are a predictive source of small molecules for controlling pathogenic fungi. Further, mode of action and small molecule identification have to be carried out.

Key words- *Solanum violaceum* L., Endophytic fungi, Antagonistic activity.

Rapid assessment of Organochlorine pesticide residues in selected vegetables Markets in Lagos Nigeria using the QuEChERS method of extraction with Gas chromatography and Mass Spectrometry.

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A major limiting factor in pesticide residue analysis is the difficulty in separating the residues from the sample matrix. The separation of pesticides and other chemical contaminants from food samples prior to subsequent analytical hitherto require much efforts and solvents. This review addresses the use of the QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) method for pesticide residue analysis in vegetable matrices. The QuEChERS method of sample extraction is used to rapidly extract various Organochlorine residues from samples of vegetables purchased from various markets in Nigeria. The extracts were analyzed with Agilent GC-MS and the residues quantified. Fifteen (15) Organochlorine pesticides residues (alpha-HCH, beta-HCH, lindane, chlorothalonil, delta-HCH, heptachlor, aldrin, heptachlor epoxide, endosulphan I dieldrin, dieldrin, endrin, endosulphan II, p, p' -DDD, endosulphan sulfate, and p, p' - DDT), were analyzed in four vegetables (Cabbage (*Brassica oleracea*) Cucumber (*Cucumis sativus*) Carrot (*Daucus carota* ssp. *sativa*); Eggplant (*Solanum melongena*)) bought from markets in the two seasons of the year. The four vegetables samples were processed using a QuEChERS extraction technique and gas chromatograph equipped with mass spectrometry detector (GC-MS). Alpha-HCH was the predominant residue in all the samples analyzed, at the mean concentrations of 0.09 mg/kg, followed by heptachlor with a concentration of 0.05 mg/kg and delta-HCH with a concentration of 0.032 mg/kg. The least mean concentration was recorded for dieldrin at 0.02 mg/kg followed by endosulphan I with a concentration 0.03 mg/kg and aldrin with a concentration of 0.04 mg/kg. Cabbage has the highest total pesticide residue load of 30% of the total while eggplant has the least total residue load of 21%. Organochlorine pesticide residues were present in most of the samples of vegetables examined, they were however within permissible maximum residue limits (MRL) for such vegetables. Further efforts by regulatory agencies is required for the monitoring of the application of these pesticides in agriculture and food storage to ensure continuous safety compliance in Nigeria.



**Studies on Respiratory and Behaviour Dysfunction as an Index of
Fenoxaprop-P-Ethyl toxicity in the freshwater fish *Cyprinus carpio***

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Static renewal bioassay experiment was conducted to determine the acute toxicity (LC_{50}) of commercial grade herbicide Fenoxaprop-P-Ethyl (FPE) to common carp, *Cyprinus carpio*. The acute toxicity of Fenoxaprop-P-Ethyl to carp fingerlings exposed to 96 hrs was found to be $300\mu\text{g/L}$. The one-fifth of LC_{50} for lethal studies i.e $75\mu\text{g/L}$ for 1,2,3 and 4 days and for sublethal studies 1/8th of LC_{50} i.e. $37.5\mu\text{g/L}$ for 1,15,30 and 45 days. The carp in toxic media exhibited irregular, erratic and darting moments, hyper excitability, loss of equilibrium and sinking to the bottom, bursting swimming, which might be due to the inactivation of AchE activity which results in excess accumulation of acetylcholin in cholinergic synapses leading to hyper stimulation. Variation in oxygen consumption were observed in both lethal and sublethal concentration of Fenoxaprop-P-Ethyl respectively. There considerable variation in respiratory rates may be a consequence of impaired oxidative metabolism which leads to impairments in fish respiration physiology and behavioral responses even under recovery tenures may be due to slow release of sequestered FEP from the storage tissue in the sub lethal concentration, found under stress, but that was not fatal.



Pharmaceutical effluence and Pesticide Waste in Nigeria: A Review

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Technological advancement among emerging countries of the world has become a platform for industrialization, therefore both government and private individuals have directed their efforts towards establishing industries, consequently industrial wastes depend on the type of industry. Industrial discharge of active pharmaceutical and pesticide effluence in to the environment in middle and low income countries is not sufficiently regulated. Acute and chronic pharmaceutical poisoning usually results from consumption of foods as a result of phytotoxicity, chemical incidence in the industries and occupational exposures in agriculture. About 15000 metric tons of pesticides comprising about 135 pesticides chemicals are imported into the country. About 79.4% of the pharmaceutical companies in Nigeria were found not to treat their pharmaceutical effluence before its discharge as reported in a research conducted using questionnaire to ascertain waste management practice among the pharmaceutical companies in Nigeria. Typical among the effects are the cause of neurological disorder, cardiovascular disease, dermatitis, birth defects, cancer among others. There is a need to enforce treatment of effluence from pharmaceutical and pesticide manufacturing companies before discharge into the environment.

Keywords: Acute, Chronic, Effluence, Pharmaceuticals, Pesticides.



COMPARATIVE STUDY ON CATALYTIC ACTIVITY OF α - AMYLASE BY NANOPARTICLES

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The α -amylase enzyme activity was determined using the DNSA method and screening plate assay method. To determine the best conditions for α -amylase activity with and without nanoparticles like Iron oxide, Graphene oxide and Silver nanoparticle. The major objective of the study was to assay if there is an increase in enzyme activity using nanoparticles and which has played major role. Colloid stability is one of the properties of nanoparticles. Thus, the nanoparticles synthesized in the study is confirmed to be stable. The study confirmed that there was an increase in enzyme catalysis by Iron oxide nanoparticles of 22.22 μ g of maltose/min. From the results obtained, it was found that increasing catalysis order is Iron, Graphene and Silver nanoparticle. It was also observed that the Silver nanoparticle had an inhibitory effect thus resulting in reduced activity.

Keywords: Enzyme; Iron oxide nanoparticle; Graphene nanoparticle; Silver nanoparticle

CHARACTERISTIC OF *Salmonella* spp. ISOLATED FROM RAW CHICKEN AND MEAT CONTACT SURFACES AND THEIR ANTIBIOTIC SUSCEPTIBILITY PROFILE

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Various cases of foodborne diseases are associated with the consumption of contaminated poultry meat. One of the major foodborne diseases worldwide is caused by *Salmonella* or known as salmonellosis. Evisceration step during poultry meat production is also one of the main sources of *Salmonella* contamination and may also spread *Salmonella* strains that are resistance to various antibiotics to the other raw chicken meat or meat contact surfaces. Thus, this study focuses on the confirmation of *Salmonella* spp. by using biochemical test and Microgen GN-ID A+B, identification of *Salmonella* spp. by using PCR method and determination of their antibiotic susceptibility profile towards selected antibiotics. The characteristic of *Salmonella* spp. isolates were confirmed by using biochemical test and Microgen GN-ID A+B System. Identification of *Salmonella* spp. isolates was carried out by PCR method using the specific primers targeting ST11 and ST15 genes at random sequence. Determination and antibiotic profiling of *Salmonella* spp. isolates was done by using Kirby-Bauer disk diffusion method towards 11 selected antibiotics which were penicillin, chloramphenicol, erythromycin, tetracycline, trimethoprim-sulfamethoxazole, amoxicillin, ampicillin, cephalixin, cefoxitin, cefotaxime and ceftriaxone. All 7 isolates identified as *Salmonella enterica* Group I by using biochemical test and Microgen GN-ID A+B System. All isolates were confirmed *Salmonella* spp. at random sequence targeting ST11 and ST15 gene with amplification size of 429 bp. The antibiogram testing revealed that all the 7 isolates (100%) were resistant towards penicillin, chloramphenicol, erythromycin, and tetracycline with no inhibition zone. There were 4 isolates (57.14%) that showed resistant towards trimethoprim-sulfamethoxazole, amoxicillin and ampicillin. However, sensitivity was recorded for cephalixin, cefoxitin, cefotaxime and ceftriaxone. The highest multiple antibiotic resistance (MAR) index was 1.00, indicated by the resistance of P2 isolate to all antibiotics used. Whereas, the lowest multiple antibiotic resistance (MAR) index was 0.36 represented by CB, M2 and M3 as they were resistant to only 4 antibiotics. However, all 7 isolates (100%) were resistant to at least 4 antibiotics showed a

multi-drug resistance profile. Our results demonstrated that the isolated *Salmonella* spp. was a source of multiple antimicrobial-resistant of *Salmonella* and can contribute to a major health concern in Malaysia.

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Effect of Methanolic Leaf Extract of some Medicinal Plants on Leeches (hirudinea)

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Leeches are known to affect fishes by their attachment and feeding habit leading to secondary infections. This study was aimed at evaluating the effects of four selected plant extracts- *Cassia alata*, *Costus afer*; *Fiscu sur* and *Platostoma africanum* in the control of leeches. Different concentrations of the extracts were used (0.1ppm, 0.2ppm, 0.3ppm, 0.4ppm, 0.5ppm, 0.6ppm and 0.7ppm) at different time of exposure. Secondary metabolite; Alkaloid, flavonoid, tanins, terpenes, and saponins were all screened from all the plant. The leeches were treated with the different plant concentrations and their effects were observed in their percentage mortality. The total death and mortality rate of the leeches were 65(30.81%), 62(29.38%), 48(22.75%) and 36(17.06%), for *Platostoma africanum*, *Costus afer*, *Cassia alata*, and *Fiscu sur*, respectively. Mortality rate and plant effectiveness was in the order *Platostoma africanum* > *Costus afer* > *Cassia alata* > *Fiscu sur*. This study suggests that *P.africanum* would be most effective in the control of leeches. The effectiveness of the plant extracts increases with time of exposure and concentration. The analysis of variance shows significant differences ($p < 0.05$) among the tested plants to the mortality rate of the leeches. There was a strong and positive correlation between the time of exposure and concentration of leaf extract. Therefore, the use of these plant extracts in aquatic bodies may control the infestation of leeches and its population.

Keywords: Leeches, *Cassia alata*, *Costus afer*; *Fiscu sur* and *Platostoma africanum*



Acute and subchronic toxicity of the hydroalcohol extract of the leaves of *Terminalia catappa* Linn. (Combretaceae) in Wistar rats

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Introduction: The leaves of *Terminalia catappa* are widely used traditionally for the management of various diseases and have shown various pharmacological activities. The information on its toxicity is however very scarce. This study seeks to investigate the acute and subchronic toxicity of the hydroethanol extract of *Terminalia catappa* in rats.

Methodology: Female Wistar rats were given 500, 1000 and 2000 mg/kg of the extract once, to assess the acute toxic effect. In the subchronic study, male rats were administered 50, 200 and 800 mg/kg of the extract for 28 consecutive days. The general behaviour, body weight, organ weight index, hematologic and biochemical parameters as well as histopathology were analysed.

Result: There were no signs of toxicity or mortality in the acute toxicity test. In the subacute test, there was also no mortality, no alteration in physiologic parameters, however, there was a significant increase in the liver weight and mild pathological lesions in the liver and kidney.

Conclusion: Oral administration of the hydroalcohol extract of *T. catappa* should be done with care as it can be potentially toxic with prolonged use.

Keywords: Toxicity, Haematology, Biochemical parameters, *Terminalia catappa*



Nutritional composition and antioxidative potentials of fermented fluted pumpkin seed (ogiri) extract on H₂O₂-induced oxidative stress in rats

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Nutritional composition and antioxidative potentials of fermented fluted pumpkin seed (ogiri) extract on hydrogen peroxide induced oxidative stress in rats was investigated using standard analytical methods. Twenty four (24) albino rats were divided into 4 groups of 6 rats each and kept to acclimatize for 1 week with normal feed and water. Oxidative stress was induced with H₂O₂ intraperitoneally at 200 µM/KgBW of rat on the 27th day for 3 days. Group A received normal rats feed and water only, group B received H₂O₂, while groups C and D received 100 and 200 mg/KgBW of seed extract respectively. The proximate analysis revealed substantial percentage of crude fibre, crude lipid, crude protein and carbohydrate. Vitamins B₂, B₁ and C were predominant, phosphorus, magnesium and calcium occurred most. Flavonoids, alkaloids, total phenol and total carotene antioxidants were detected in the sample. There was a significant decrease ($P < 0.05$) in the CAT, SOD and GST activity and a significant increase ($P < 0.05$) in MDA concentration of H₂O₂ treated rats when compared to the control. Administration of fermented fluted pumpkin seed extract reversed this effect at the respective doses. In conclusion, fermented fluted pumpkin seed extract had good nutritional qualities and positively modulate oxidative stress damage.

Keywords: Antioxidants, oxidative stress, antioxidative enzymes.



A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF *FRAGARIA X ANANASSA* (ROSACEAE): NATURE’S GIFTS

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India is a rich source of various types of medicinal herb. Nature has provided a full store of remedies to cure disease problem of human. The natural remedies are the backbone of medicines. Now days, the whole world is suffering from the COVID -19 pandemic it is important to boost up the immunity power of the human body to survive. *Fragaria x ananassa* is one of the medicinal plants which are being used from ancient time to till date for boosting human immunity power and treating different health disorders. This article aims to review the pharmacological activity of *Fragaria x ananassa* based on an extensive literature survey. The plant is commonly known as 'strawberry' which belonging the family 'Rosaceae'. It is mainly found in different part's of the world India, China, USA, Mexico, Egypt, Turkey, Spain. Many enormous number of phytochemical constituents also obtained from this plant for this reason is called "The Magical Tree". Various nutrients like calcium, phosphorus, potassium, magnesium, Copper, sulfur present in this plant make it nutraceuticals plant. The review reveals that wide ranges of phytochemical constituents have been isolated from the plant like tannis, anthocyanins, flavonols, ellagitannins, gallotannis, phenolic acid, salicylic acid, caffeic acid etc. The major pharmacological activities showed by these plants are anticancer, anti-inflammatory, antidiabetic, antioxidant, antiobesity, cardio vascular disease protection, antimicrobial. Therefore, it can be concluded, that *Fragaria X ananassa* be claimed as a natural source of phytochemical constituents, traditional uses which provides approval for further pharmacological and clinical investigation.

Keywords:- *Fragaria x ananassa*, Antioxidant, Gallotannis, Antidiabetic.



A COLOURFULL TOMATO: STUDIES

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Tomato fruits having some Bio-chemical pigments like viz. Carotenoids and Flavonoids. These pigments are more significant and beneficial for the human health. Red ripen tomatoes have a Lycopene rich pigments. The pigments variation leads to the different fruit colours in tomato. The current understanding about the genetics behind these interesting characters on the basis of the global nutritional and urban habitats of the farmers or people for the cultivation of tomato crops for the survival in significant. The main healthy promotion promoting components in or among ripen tomato fruits like red-ripen tomatoes banophyl of fruits colour variations are available in this crop. The article an over-view regarding the genetics basis of this fruits colour variation in tomato presented.

KEYWORDS: Carotenoids, Flavonoid, Lycopene, Beto-carotene, Healthy promoting components.