IBCFT - 2019

Innovations in Biochemical and Food Technology

Conference Proceedings

Editors:

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ISBN : 978-93-88413-28-2

INNOVATION IN BIO CHEMICAL AND FOOD TECHNOLOGY

Editors

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Foreward - From the Principals desk

Kumaraguru College of Technology, an acclaimed and illustrious institution is an autonomous and self-financing college affiliated to Anna University. The motto of the institution is "CHARACTER IS LIFE" and each individual of the college abides to it. The institution provides a challenging and technologically advanced learning environment to the students. The college is accredited by NAAC and the programmes by NBA. The architecture and ambience serves to enhance a transcendental learning context.

The Department of Biotechnology, established in the year 2002 has been ever brimming with new innovations and serves to nurture thoughts and to provide solutions to the issues faced in our country. The department always strives towards progress through its numerous projects, research and development initiatives which have received funding by various government agencies like DST, DBT, AICTE, FIST etc. The main limelight is on three upcoming fields like medical biotechnology, Environmental biotechnology and food biotechnology.

I am happy that the National conference on "**Innovations in Bio Chemical and Food Technology - 2019 (IBCFT - 19)**" is being organized for the students all over the country who have a thirst for knowledge and learning. This conference will definitely help them excel in their field of choice. This is a wonderful opportunity for all the students to exhibit and inculcate various skills and also a learning ground for budding biotechnologists and I suggest everyone to kindly make use of the conference. My best wishes to the team and all the participants!

(Principal - Dr. J Senthil)

Foreward - From the HOD's desk

The Department of Biotechnology, established in the year 2002, has been open to research, innovation and development since then. The Centre offers both Full time and part time research programmes serving as stepping stones towards Ph.D and Research. The department holds research and development budget of Rs 1.50 Crores obtained through various government-recognized funding agencies like DBT, DST, AICTE and UGC. The department is recognized by FIST-DST. The department has been awarded with 3 Indian patents and has filed for 6 patents. It holds numerous skill development and consultancy services in specific areas like herbal technology, enzymes for industrial applications, wastewater treatment and so on. Major areas of specialization include Medical, Food and Environment Biotechnology.

To promote more such endeavors, the department of biotechnology is organizing a National Conference on Innovations in Bio Chemical and Food Technology - 2019 (IBCFT-19) , which aims to explore recent advancements and research trends in the fields of Bio, chemical and food technology to provide solutions to challenging issues faced in our society. The conference covers multiple themes like, Chemical science and engineering which includes separation process, process modeling and so on. Food science and technology covers food microbiology, food chemistry etc. Bioscience and technology encompasses biopharmaceuticals, bioremediation, bioresource etc.

This wonderful opportunity should be made use by all aspiring students to propagate their knowledge through interaction and learning.

Kudos and best wishes to the whole team and all the participants!

(HOD - Dr. N. Saraswathy)

Foreward - From the organizer

On behalf of the organizing committee, I demit a great privilege in furnishing the proceedings of the National Conference on Innovations in bio chemical and Food Technology organized by Kumaraguru College of Technology, Coimbatore. Recent explorations in Laboratory for Bioremediation Research led to many project developments in the arena of Bio-energy, Food Processing and waste water effluent treatments and these works have been published in many high impact and reputed journals. In this juncture our academic researchers have found three significant areas of which on which this national conference is proposed to.

The main objective of the"IBCFT-2019" Conference is to provide a forum for presentation and explore recent trends and advancements in the field of Bio-chemical and Food Technology which brings suitable and economic solutions via innovative and cost-effective approaches. The topics of technical program have been divided into 3 thematic sessions and several sub-thematic related topics. More than 300 abstracts were received from various participants across the country. Out of them about 100 papers have been selected for paper presentation and about 30 of them have been chosen for poster presentation. All the nominated oral presentation are published in ICI indexed in UGC, approved American International Journal of Research in Science, Technology, Engineering and mathematics as a special issue. All the papers appearing in the proceedings were peer-reviewed by renowned reviewers in those fields. A special attention was paid to ensure the high quality of the accepted papers.

We are grateful to the Institute of Engineers India, Student chapter, KCT who assisted to promote and also support our conference. We also address our sincere thanks to the speakers and members of this Conference.

Finally, extending a hearty welcome to Kumaraguru College of Technology, Coimbatore and wishing a blissful experience at the Conference.

(Organizing secretary - Dr. N. Sivarajasekar)

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Acknowledgement

As an organizer I would extend the student team in bringing up the book.

COVER PAGE DESIGN: Vivek Jagadeesan Sharavanan

S.No	Title	Page

Biological Science and Technology

Chemical Science and Technology

Food Science and Technology

Biosciences and Technology

Optimization of Endoglucanase Production Using Mixed Substrate by *Trichoderma viride*

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Abstract

The production of endoglucanase by *Trichoderma viride* using mixed substrate (Wheat Bran, Rice Bran).In this work, the application of Response Surface Methodology (RSM) is presented for optimization of production of endoglucanase using agrowaste.The goal was to improve production conditions in batch process, i.e., to minimize the substrate concentration and to increase the product concentration of endoglucanase. A full factorial Central Composite Design (CCD) was employed. Analysis of variance (ANOVA) showed a high coefficient of determination value (R^2=0.97) and satisfactory prediction second-order regression model was derived. Maximum endoglucanase activity was predicted and experimentally validated. The endoglucanase production was significantly affected by fermentation time, inoculum size, pH and temperature. The optimum values of the parameters X_1, X_2, X_3, X_4 were found to be 29 °C, pH 5.47, 71.83 hrs and 2.16 mL respectively.

Keywords: *Trichoderma viride*, Kinetics, Endoglucanase, Fermentation, Response Surface Methodology

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Enhanced Production of Pectinase from *Aspergillus awamori* by Solid-State Fermentation using Rice Bran

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Abstract

The present work deals with the production of pectic enzymes using *Aspergillus awamori* by solid state fermentation technology. Agro industrial wastes like rice bran is employed as fermentation media along with nutrient solutions. Analyses for the maximum production rate of pectinase are studied by varying the media composition, pH level and fermentation temperature to optimize these physio-chemical characters. The maximum pectinase enzyme yield by *Aspergillus awamori* using rice bran ml of 67.59 U/l substrate was obtained. The optimum values for the independent variables were, Substrate concentration of 10 g. The initial pH of fermentation media of 5, fermentation temperature of 40°C.

Keywords: *Aspergillus awamori*, lovastatin, solid state fermentation.

***

Biosynthesis of Cholesterol Lowering Drug from *Aspergillus terreus* by Solid State Fermentation

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Abstract

Lovastatin ($C_{24}H_{36}O_5$), a potent drug for lowering blood cholesterol acts by competitively inhibiting the enzyme HMG–CoA reductase which catalyzes the rate limiting step of cholesterol biosynthesis. The strain *Aspergillus terreus* MTCC279 was obtained from the Institute of Microbial Technology, Chandigarh, India, was found to produce higher concentration of lovastatin. In order to screen the best solid substrates for lovastatin production by *A. terreus*, the following substrates were experimented; including besan flour (*Cicar aritinum*), ragi (*Eleusine coracana*), baggase, millet (*Pennisetum Typhoides*), rice flour, wheat bran, black gram (*Vigna mungo*), green gram (*Vigna radiata*), green peas, yellow peas, ground nut cake (*Arachis hypogaea*), white beans, maize, rice bran (*Oryza Sativa Francais*), long grain rice (*Oryza sativa indica*), sago (*Manihot esculanta*), coffee husk powder, barley (*Hordeum vulgare*), sesame waste (*Sesamum indicum*), jack fruit seed. Among the fifteen different solid substrates tested, maximum lovastatin of 569.55 mg per g of dry solids was obtained from green peas. Green pea was found to be the best substrates for the lovastatin production via SSF process than the remaining substrates. The quantitative analysis of lovastatin was carried out in shimadzu HPLC at 238 nm in Luna C18 column of particle size 5μ and ($250X4.6$) mm I.D, UV detector (SPD 20 A). Binary gradient system was used and the samples were injected manually using Rheodyne Injector of 20 μL.

Keywords: *Aspergillus terreus*; lovastatin; solid-state fermentation

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Packed Entrapped Microbial Cells for Treatment of Simulated Textile Wastewater

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Abstract

Treatment of waste water from textile industries poses a threat to the environment and bio treatment with white rot fungus *Trametus hirsuta* seems to be a very good option. In this study simulated textile waste water with pH 9.9 was used to treat by 0.2cm Na-alginate immobilized *Trametus hirsuta* beads as the packing materials in packed bed reactor. The reactor was operated continuously at different volumetric flowrates (0.026ml/s, 0.057ml/s,0.102ml/s,0.204ml/s and 0.408ml/s) and different initial COD for simulated textile waste water concentrations (775mg/l, 1550mg/l, 2325mg/l and 3100mg/l). The maximum COD removal efficiency of 71.2% was obtained for low influent COD of 775mg/l simulated textile waste water concentration at the volumetric flow rate of 0.026ml/s (32 min HRT).

Keywords: *Trametes hirsuta*, Immobilized beads, Simulated Textile Waste Water, Hydraulic Retention Time (HRT), COD.

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Microbial Production of Xylitol in Optimized Conditions from Rice Straw

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Abstract

Microbial production of xylitol is being researched as an alternative method for xylitol production. The present study evaluated xylitol production from rice straw through batch fermentation. The pretreated hemicellose hydrolysate was fermented by *Candida guillermondii* in submerged fermentation. Screening and optimization were done using statistical methodology based on experimental designs. Various nutrients are designated and screened by Plackett-Burman design. Selected nutrients are optimized to maximize the xylitol production by Box-Behnken design of Response surface methodology (RSM). The optimum medium concentrations and operation conditions for maximum xylitol production are: KH_2PO_4- 3.42 g/L, yeast extract- 4.38 g/L, $MgSO_4$.7H2O- 1.2 g/L, glucose 10.42 g/L, temperature- 30.8 °C, substrate concentration- 2.93 g/L, pH- 7.18, agitation speed- 168 rpm and inoculum size- 3.41 mL. At this optimized medium concentrations and operation conditions the maximum xylitol production was found to be 0.71 g $g^{-}1$. These results show that under appropriate level of process variables, experimental analysis reveals that the maximum yield of xylitol for rice straw using *Candida guillermondii*.

Keywords: Xylitol, Rice straw, *Candida guillermondii*, Optimization, RSM.

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Chemical Composition of Ethanol Extract of *Diosypros montana* Roxberg Leaves and its Biological Activites

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Abstract

The present study examines the nature of phytoconstituents , GC-MS analysis for determining the chemical compostion and in vitro anticancer activity of ethanol extract of *Diospyros montana* Roxberg leaves. The preliminary phytochemical screening conducted by usual chemical tests indicated the presence of alkaloids, carbohydrates, fatty acids, flavonoids, phenols, saponins and tannins. GC-MS analysis of the ethanol extract of D. montana. leaves revealed the presence of 14 compounds. The important compounds was Squalene (1.86), phytol (6.09), Adipic acid (2.95), fenchyl acetate (0.69), octadecanoic acid (1.78), 1-octadecane (1.53), nonadecane (1.46), 2-cyclohexen-1-one (1.31) and other compounds. The in vitro anticancer activity was tested against MOLT-3 cell line. The ethanolic extract of leaves of D.montana showed significant dose dependent anticancer activity. The IC50 value was determined as 57.54 l. This is the first kind of report to test the ethanol extract of *D.montana* roxb. for anticancer activity.

Keywords: *Diospyros montana*, GC-MS, in vitro anticancer activity, MTT assay and MOLT-3 cell line

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Evaluation of Phytoconstituents of *Feronia limonia* and its *in-vitro* Cytotoxicity

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Abstract

For the continuation of phytochemical research and isolation of active constituents, the present investigation evaluated the preliminary phytochemical screening and in vitro cytotoxicity of ethanol extract of the tree *Feronia limonia* which belongs to family Rutaceae and have many traditional uses. Phytochemical screening revealed the presence of flavonoids, steroids, coumarins, phenolics and terphenoids. The ethanol extract of *F. limonia* was subjected to GC-MS analysis, a total of 17 compounds were identified and the major compounds of *F. limonia* were 6-methyl-1-(1-naphthyl)dihydrouracil (9.12), 2-Hexadecen-1-ol, 3,7,11,15-tetramethyl (5.99), Eicosane (5.08), Nonadecane (5.52), Pentadecane, 2,6,10,14-tetramethyl (5.05), Eicosane (5.08) and other compounds. Invitro cytotoxicity was performed using MOLT-3 cancer line by MTT assay, which showed IC50 value of 63.24l. The ethanol extract of this plant has significant cytotoxicity against tested cell line.

Keywords: *F. limonia*, MOLT-3, coumarins, flavonoids and MTT assay.

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Statistical Screenings of Medium Components for the Production of Chitinase by *Trichoderma viride*

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Abstract

Statistics based experimental designs were used to optimize the medium components for chitinase production. Optimization studies were performed on strains of T.viride, which produce Chitinase enzyme using sugarcane bagasse as substrate. Preliminary studies on the factors enabled identification of eight variables important with respect to chitinase production. The CCD contains a total of 31 experimental trials involving the replications of the central points. The dependent variables selected for this chitinase yield (U/gds). The most important factors with respect to each strain were then identified using fractional factorial. In general, colloidal chitin, KH_2PO_4, yeast extract and $MgSO_4$.7H2O affected Chitinase production. CCD was used for model building and chitin and yeast extract were found to have an interactive effect on chitinase production in T.viride whereas yeast extract alone had a quadratic effect on chitinase production in the strain. Similarly, colloidal chitin and yeast extract had a quadratic effect on chitinase production in T.viride. The optimal values of important variables were determined by response surface methodology (RSM) and numerical optimization. This optimization strategy led to an increase in chitinase production is 33.02 U/gds in the strain using sugarcane bagasse as substrate.

Keywords: Chitinase, *Trichoderma viride*, Optimization, Plackett-Burman, Sugarcane bagasse.

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Evaluation of Phytoconstituents of *Andrographis Paniculata* and its *In Vitro* Antioxidant Activity against DPPH And ABTS Assay

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Abstract

GC-MS study of chloroform extract of *Andrographis paniculata* revealed the presence of 26 compounds. The major compounds are Bis (2-ethyl hexyl) phthalate(53.608%), dibutyl phthalate(10.537%) and phenol, 2,5-bis (1,1-dimethyl ethyl)(5.079%) and the minor compounds are phthalic acid, butyl-tetrdecyl ester (1.00%), octadecane, 3-ethyl-5-(2-ethyl butyl)- (1.022%) and heptadecane, 9-hexyl (1.034%). In-vitro antioxidant activity carried out for chloroform extract of *Andrographis paniculata* by DPPH and ABTS assay. The extract shows moderate activity against DPPH and ABTS. It's Ic_{50} values are11.17 (g/ml) and Ic_{50}= 58.74 (g/ml) respectively.

Keywords: *Andrographis paniculata*, DPPH and ABTS assay.

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Hydrogen Production from Distillery Wastewater using Anaerobic Sequencing Batch Reactor (AnSBR)

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Abstract

Energy, an urging need of the daily life is going on depleting while the demand for is increasing with time biohydrogen technology provides an alternative source of energy and hails as an typical appropriate technology that meets the basic need for cooking fuel in rural India.The aim of the study is to determine the basis for the design of an Anaerobic Sequencing Batch Reactor (AnSBR) operated in mesophilic conditions for the treatment of distillery wastewater. To studied the characteristics of raw distillery wastewater such as pH = 3.9, BOD = 40000 mg/l, COD = 100000 mg/l, TS = 95000 mg/l and characteristics of sludge pH = 5.3, TS = 107000 mg/l were also analysed. Initially the treatment of distillery effluent by an AnSBR at lab scale was carried out using a reactor of 5 L volume. The reactor was designed with 10 cm diameter and 62 cm height, the gas escape valve and other probes are 2 cm. The reactor was fed with distillery wastewater and sludge is maintained at 2 weeks. The AnSBR was operated in 24 h HRT with various cycles of OLR. The OLR was 2.5 kg COD/m^3.d, 3.5 kg COD/m^3.d and 4.5 kg COD/m^3.d. The efficient COD Removal efficiency is 61.77%

Keywords: Distillery waste water, Anaerobic Sequencing Batch Reactor (AnSBR), Hydraulic Retention Time ((HRT), Organic Loading Rate (OLR), Chemical Oxygen Demand (COD)

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Phytochemical Analysis and *in vitro* Anticancer Activity of Ethanol Extract of *Wrightia tinctoria*

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The present study examines the nature of phytoconstituents and in vitro anticancer activity of ethanol extract of *Wrightia tinctoria* leaves. The preliminary phytochemical screening conducted by usual chemical tests indicated the presence steroids, alkaloids, terpenoids, flavonoids, glycosides and phenolic compounds. GC-MS analysis of *Wrightia tinctoria* ethanolic extract revealed the presence of eighteen compounds. In the present study, the major chemical constituents are 2,5-Dimethoxybenzaldehyde oxime (9.52%), 5,5-Dibromo-4-methoxymethoxymethyl-2,2,6,2-terpyridine (6.31%), 4-(4-Chlorobenzoyl)-1-cyclohexyl-5-tosylamino-1H-1,2,3-triazole (4.68%) and 2-Ethyl-5-propylpyridine (4.23%). The in vitro anticancer activity was tested against lung cancer (NH40) cell line using MTT assay. The ethanol extract of W. Tinctoria showed dose dependent anticancer activity. The IC50 value was 100g/ml. The result revealed that *W. tinctoria* plant has significant anticancer activity.

Keywords: *Wrightia tinctoria*, GC-MS, in vitro anticancer activity, NH40 cell line, MTT assay

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Recent Trends and Prediction of Long Intergenic Non-coding RNA - A Review

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Abstract

Long non-coding RNAs (lncRNAs) are group of transcripts synthesized within the cells of all organisms. Theyplay a crucial role in the various cellular processes viz.,transcription regulation, chromatin remodelling. At present, onlya small number of lncRNAs have been studied experimentallygiving some important insights on the function they play in regulating the gene expression and other cellular processes.Due to its profound involvement in the cellular process, the identication of lncRNAs have emerged to be cutting-edge trendin biology. Several computational methods and tools are availablefor the prediction of lncRNAs. Here, in this review the currentcomputational tools available for prediction of lncRNA alongwith their features and algorithms mentioning their accuracybeen discussed. In addition, various databases containing theannotated lncRNAs are been highlighted. Further, the limitationsof the tools and methods with the perspective towards developingnew tools for prediction were also discussed.

Keywords: Long non-coding RNA, transcriptional regulation, computational tools.

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Removal of Dyes from Textile Dyeing Industry Effluent using *Trametes pubescens* in Batch Reactor Optimization and Kinetic Studies

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Abstract

In this work, statistical tool, response surface methodology (RSM) was applied for the optimization of process parameters for the removal of dyes from an aqueous solution using a white rot fungi, *Trametes pubescens*. The linear and interactive effect of process parameters like pH, temperature, agitation speed and dye wastewater concentration on dye decolourization and organic matter removal were studied. From the results, the optimized conditions were found to be: pH 6.7, temperature 28.50°C, agitation speed 185 rpm and dye wastewater concentration 1:2. At these optimized conditions, the maximum decolourization and organic matter (COD) reduction were found to be 77.3% and 85.8%. A model was proposed for the organic matter removal based on these variables. A high R^2 value show that RSM is better suitable for the removal of dyes. Kinetic studies were also carried out using different models like first-order, diffusional and Singh model. From the results, it was found that the degradation follows the first-order reaction model.

Keywords: Dye, Wastewater, Biodegradation, RSM, COD removal

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Studies on the Antioxidant Activity of the Fern *Hemionitis arifolia* (Burm.) Moore

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Abstract

In the present work, antioxidant ability of extracts obtained from the fern *Hemionitis arifolia* (Burm.) Moore, which is endemic to India, was investigated. Fresh fronds were used in enzymatic assay and dried fronds were used in non-enzymatic assay. Antioxidant contents of the fronds of the fern H. arifolia was determined by adopting three common enzymatic assay (Catalase, Ascorbic acid oxidase and Polyphenol oxidase) and antioxidant contents of the methanol extract from the fern fronds were evaluated by adopting non enzymatic methods like DPPH radical scavenging activity, ABTs radical scavenging activity, Nitric oxide radical scavenging activity, total antioxidant assay and FRAP assay methods. The fronds contains the enzymes catalase, ascorbic acid oxidase and polyphenol oxidase of 32.69 Units/g tissues, 0.001 Units /g tissues and 0.0421 Units /g tissues respectively. DPPH, ABTs, Nitric oxide scavenging activity exhibited an IC50 value of 47.84mg/ml, 36.73 mg/ml and 125 mg/ml respectively. Total antioxidant activity and FRAP assay exhibited significant activity and its absorbance increased with increase in concentration. The present study suggests that H. arifolia has significant antioxidant activity and may be useful for the discovery of novel antioxidant agents of fern origin and used in pharmaceutical industry.

Keywords: Enzymatic assay; DPPH; ABTs; Nitric oxide; Total antioxidant activity; FRAP assay

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Fluorescent Biomarkers in Environmental Monitoring

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Abstract

The world is being inflicted by various toxic substances that affect its life forms. Anthropogenic causes are the main reasons for the harm caused to the natural environment, home to a million species. Diverse flora and fauna are becoming extinct due to the disturbances in their ecosystem. Pollution abatement is possible with the help of biomarkers. Biomarkers help us to know the pollution levels, the type of pollutant and can be used to assess the extent of toxicity in that environment. This review focuses on the various fluorescent biomarkers used in different ecosystems and compares the methods of detection. Other biomarkers can also be used but it depends on the species and the level of sensitivity required for the specific site. Periodic monitoring after cleaning up of pollutants can be estimated using biomarkers and this helps us understand how much more abatement is required until the area is safe and will thrive again and contribute as an aesthetic beauty.

Keywords: Biomarkers, fluorescent biomarkers, GFP, FISH.

***

Synthesis and Characterization of Ch-PEG-Ag Nanoparticles using *ficuscarica* for the Application of Medical Textiles

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Abstract

Nanotechnology plays a major role in the field of medicine nowadays due its multifunctional properties. Medical textiles are one of the most expanding sectors in the technical textile market. Nanoparticles makes a huge impact on healthcare sector and increasingly used in wound dressings and house hold products due to their antimicrobial activity.In this study,silver nanoparticles (Ag nps) were synthesized by using *Ficuscarica* fruit extract as reducing agent and it was conjugated with chitosan nanoparticles stabilized with PEG molecules.The conjugated ChPEGAg nanoparticles were characterized by UV - Vis, FTIR, DLS Particle Size & Zeta Potential to understand their physicochemical properties. Then conjugated ChPEGAg nanoparticles were test for antimicrobial activity. Further, the conjugated nanoparticles will be incorporated into medical textile due to their excellent properties.

Keywords: *Ficuscarica*, Silver nanoparticles, Chitosan nanoparticles, ChPEGAg nanoparticles, Medical Textiles, PEG.

***

Screening of Phytochemicals from *Annona muricata* Leaf Extracts and Study its Anticancer Properties

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Abstract

Natural products have been the target for cancer therapy for the past several years but there is still in need of information on potent compounds that may protect normal cells and selectively destroy cancerous cells. *Annona muricata* is one which has an antiproliferative activity on various cancerous cells. It belongs to Annonaceae family and it is also known as soursop, graviola. In this present study, phytochemicals were screened from *Annona muricata* leaf extracts and studied its anticancer properties. *Annona muricata* (graviola) leaves were subjected to extraction using three different solvents such as Ethanol, Methanol and Water. Further the leaf extracts were analysed for the phytochemicals such as alkaloids, saponins, terpenoids, flavonoids tannins, anthraquinones, glycosides, phenols and steroids by both qualitative and quantitative methods. The results showed the presence of phytochemicals like alkaloids, flavanoids, tannins, glycosides, phenols and steroids in both methanol and ethanol extracts. Water extract not showed the presence of required phytochemicals. The methanol extract showed the higher amount of phytochemicals mentioned above than ethanol extract. Further, antioxidant properties were evaluated by DPPH assay. In future, MTT assay will be performed to analyse the anticancer property.

Keywords: *Annona muricata*, Cancer, DPPH assay, graviola, MTT assay, phytochemicals.

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Quantitative Phytochemical Screening of *Filicium decipiens* Wight & Arn. Leaves

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Abstract

The quantitative phytochemical analysis was conducted on the leaves of Filicium decipiens for the content of secondary metabolites like alkaloids, flavonoids, glycosides, saponin, phenol and tannin by gravimetric and spectrophotometric methods. It is revealed that saponin (78 mg/g) and flavonoid (64 mg/g) content was present in maximum amount than the other secondary metabolites in the studied plant sample. The results of the present study support the therapeutic usage of the secondary compounds that can be used in new drugs for the treatment of various diseases. Hence it is confirmed the presence of phytochemicals and their respective quantities in the leaves of F. decipiens and further, the appropriate medicinal value is to be checked with relevant experiments and animal models.

Keywords: Filicium decipiens, Extracts, Quantitative analysis, Secondary metabolites

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Scanning, Imaging and High Frequency Phononic Analysis for Healing Effect of Controlling and Minimising the Impact on Brain of the Stroke Patients - an Ethicality View

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Abstract

Human body as one of the biological specimens having many positive and some hostile cum adverse aspects which are capable or chances of getting diseases or attacked by other parameters as the human body is highly perishable in nature. Here, some of the stroke patients are considered for some healing effects to nurture the diseases or control effect of stroke in brain by proper investigation by the methods of 1.CT scan, 2.MRI scan, 3. MRA imaging, 4.Doppler ultrasound method and got permission from ethical committee for performing the heal cum therapy. To magnify the image CTS and for Tissues MRIS and Vascular disease identification MRAI and extra cranial outfit DUS is used.

Keywords: Stroke patients, CTS, MRIS, MRAI, DUS

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Mathematical Modeling of Commensal Relation between *Streptococcus thermophilus* and *Lactobacillus bulgaricus*

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Abstract

In mixed culture microbial systems the interaction among the existing species plays a vital role in overall performance of the process. Though the interactions can be classified as negative and positive types in perspective of the single species' survival or growth, all interactions are viewed as beneficial because they act to maintain ecological balance in global context. However, in specific usage of microbial processes, interaction pattern need to be studied thoroughly for maximum output in terms of maximum degradation in waste treatment and maximum yield in production processes. The present investigation deals with mathematical analysis of commenal interaction between *Streptococcus thermophilus* (1) and *Lactobacillus bulgaricus* (2) to design a chemostat for continuous process. It was observed that the two microorganisms follows logistic type growth in pure culture and the species 1 experiences linear interaction pattern in mixed culture. The growth and interaction parameters were computed using MATLAB software and the optimum operating condition for maximum growth of the organisms in the chemostat was simulated using numerical integration technique. This methodology can be adopted to design reactors under continuous mode of operation under optimum conditions.

Keywords: Commensalism, Dilution rate, Chemostat, *Streptococcus thermophilus*, *Lactobacillus bulgaricus*

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A Review on Localization Analysis of Eukaryotic Subcellular Proteins

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Abstract

Subcellular protein localization in eukaryotic cells is essential for several protein functions and their translocations in various organelles such as the nucleus, mitochondria, Endoplasmic reticulum, cytoplasm, and Golgi apparatus. Although existing studies report various techniques to assessthe subcellular proteins localization patterns in eukaryotes those studies however do not adequately addresses their limitations. Therefore, we critically evaluate the merits and demerits of existing fluorescence proteins (FPs), epitope tags, and image analysis methods. We believe this article will serve as a beginners guide to choose appropriate technique.

Keywords: subcellular protein,interaction, fluorescent proteins, eukaryote, and epitope tags.

***

Production of Biodiesel from *Anacardium occidentale* Shell Coat Oil

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Abstract

Biodiesel becomes a popular alternative source of fuel in recent years due to the rise in awareness of the depletion and degradation of fossil fuel resources. In this paper, we have explored the benefits of using non-edible vegetable waste oil (CNSL) for the production of biodiesel. Cashew nut shell liquid oil is a multifaceted by-product of the cashew industry which possesses immense applications in polymer-based industries. Biodiesel was extracted, produced and processed to reduce its viscosity using standard protocols. Transesterification of natural oils with alcohol to alcohol esters is an efficient and technically important reaction in the production of biodiesel from CNSL. Determination of acid value is a prerequisite for the processing of the oil to analyze the free fatty acid content in it. From the results obtained, it was evident that the alkaline treatment of CNSL was required to obtain highly efficient biodiesel. We also conclude that using biodiesel blends are more efficient than using neat biodiesel (100% pure biodiesel obtained from CNSL) since it aids in reducing the vehicle emissions serving us an environmentally friendly option.

Keywords: Cashew nut Shell liquid Oil, Biodiesel, acid value, Transesterification.

***

Studies on Biogas Production from Dairy waste using Cogeneration

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Abstract

In dairy industries after every batch of milk processing the dairy scale formed on the walls of the processing tanks which are rich in carbon sources but these remains are left unused and washed away. It can be utilized in many ways such as feed manufacture for microbial culture, soap manufacture, feed for microalgae to produce biodiesel etc. But these methods are not found efficient and cost effective. So the efficient way to use this waste is to introduce it to biogas production. This dairy waste alone cannot serve as a substrate for the biogas production which could not be digested by the microbes very easily. Cogeneration is the proven technology which takes the industrial/municipal wastes as co-substrates and produce large quantity of biogas. In this case dairy waste can be used as a co-substrate with cow dung. In this study biogas was produced by cogenerating biogas at different compositions of cow dung and dairy waste. The effects of number of days, composition and co- substrate were studied.

Keywords: Dairy waste, Carbon source, Cogeneration.

***

Outcome (ambulatory and pre and post walk test values) of Task-oriented Training on Physical Appropriateness (using locomotive vector, time factor) of Stroke Survivors

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Abstract

The circuit training the study which enunciated the walking speed, walking endurance and functional ambulatory category scores of the stroke patients. The improvements in walking abilities of the subjects in the circuit training group can be due to improvements in the physical development. The subject who participates in task oriented circuit training showed highly significant improvement in ambulation than subject who received conventional therapy or any other types of heal.

Keywords: Stroke defaulters; Ambulation, Walk test, Locomotive Vector, Time Factor.

***

Pharmacological Analysis of Phytochemicals from *Desmodium gyrans* DC for the application of Type-2 Diabetes mellitus

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Abstract

Type 2 Diabetes mellitus (T2D) is a type of chronic disease, which is characterized by high blood sugar, insulin resistance, and relative lack of insulin. India has the second largest number of diabetes cases. Around 90% of people have T2D. The common medications are Metformin, Sulfonylureass, Meglitinides etc. The plant based natural remedies are also available. Some of the remedies are Aloe vera, Bilberry extract, Bitter melon, Cinnamon, Ginger and Okra. Now a days, Desmodium species are also used as a remedy for diabetes. Traditionally *Desmodium gyrans* DC has been used to treat ailments such as fever, cold, dysentery, antidote, cardiac tonic etc. The present thesis work focuses to identify the active anti-diabetic compound from *Desmodium gyrans* DC. The Anti-diabetic activity of extracted compound carried out by alpha amylase assay. Experiments were concluded with five different solvents such as benzene, ethyl acetate, ethanol, hexane and water based upon the polarity to extract the compound. GC-MS analysis of benzene extract showed that 2 - ethyl acridine, the bioactive compound gave better percentage contribution from this extract. In - silico by Molecular docking analysis showed that Ethyl acridine, Luteolin and Myricetin were the compounds mostly interacted with 6 major proteins such as TNF, GCK, PIK3CA, SLC2A4, mTOR and MAPK8.

Keywords: Type 2 Diabetes mellitus, Desmodium gyrans DC, Alpha amylase, Anti diabetic.

***

Extraction of Phytoconstituents from *Rocella Montagnei* and Evaluation of its Anti-Apoptotic Potential

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Abstract

Lichens are abundant in secondary metabolites that have been identified to contain anti-cancer and many other therapeutically significant properties. Rocella montagnei , an epiphytic lichen which remains to be one of the least exploited lichen species is expected to be a potential drug source for cancer. Extraction of phytoconstituents was performed using Microwave assisted extraction from *Rocella Montagnei* is crucial. The solvent system and process parameters such as time, pH, microwave power and liquid to solid ratio were optimized using one variable at a time (OVAT) method. Maximum yield of 31.6 mg GAE/g.dw was obtained when the sample was treated at a microwave power of 630 W for 60 seconds with a liquid to solid ratio of 10 mL/g .The crude extract was then subjected to Gas Chromatography-Mass Spectroscopy analysis for the identification of potential phytoconstituents. The compounds elucidated from Gas Chromatography- Mass Spectroscopy were then docked with anti-apoptotic protein BCL2 to evaluate the anti-apoptotic activity of phytoconstituents. Molecular docking of the phytoconstituents against BCL2 (PDB ID 2W3L) was performed using AutoDockVina. The docking score was found to be the highest for 6-Methoxyflavanone with a binding energy of -7.4kCal/mol. Further in vitro and in vivo analyses are to be performed to prove the efficacy of the drug.

Keywords: Lichen;*Rocella Montagnei*;Phytoconstituents;6-methoxyflavanone; Bcl2; Apoptosis, Cancer.

***

Multitargeted Approach Towards the Treatment of Cervical Cancer using Phytoconstituents from Lichens

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Abstract

Mycobiont and photobiont combine together to form lichens. The secondary metabolites are said to have anti-cancer activity. Lichens are one of the rich sources of secondary metabolite. In recent studies, it is reported that the rate of effect of cervical cancer is increasing day by day. Though there are a lot of Synthetic medicines for cervical cancer, they are not as promising as natural medicine. We focused on retrieving a promising drug for cancer. The protein targets that are responsible for the cervical cancers are identified and the phytoconstituents that have the potential to bind to those multi-targeted proteins are been identified. The present study is aimed at evaluating the anti-cancer potential of these compounds against the drug targets such as BCL-2, BCL-XL, Oncoprotein E6, and AMPK. Among the seven compounds chosen as ligands, Usnic acid was identified to be the most potent against all selected targets when docked against the protein of interest. Hence, there is scope for further evaluation and development of Usnic Acid as a lead molecule against cancer. In-vitro and In-vivo studies have to be performed to prove the efficacy of the selected drug for the treatment of cancer.

Keywords: Usnic Acid, Lichen, Cervical Cancer.

***

Molecular Docking Study of Apigenin-7-O-β-D-Glucuronide with Viral Oncoproteins

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Abstract

The cancer has invaded the mankind in an exponential way. It is reported that an approximate of 15 -20 % of all cases of Human cancers are caused by the viral infection such as Human Papilloma Virus, Epstein Barr Virus, Kaposis sarcoma associated Herpesvirus. Cervical cancer and the Oral cancer are the two main cancers being detected among the Indian population. The virus infects the cells of the human body and leads to the alteration of signal transduction pathways which in return cause the proliferation of the cell. Apigenin-7-O-β-D-glucuronide is a derivative of the compound Apigenin, which is mainly extracted from the plants. Various studies report the anticancer effect of apigenin and antiinflammatory effect of Apigenin-7-O-β-D-glucuronide. The study is focused on the molecular docking of Apigenin-7-O-β-D-glucuronide with the viral oncoproteins such as HPV E6, HPV E7, EBNA1, EBNA2 and KSHV. The molecular docking represents effective binding of the ligand with the selected viral oncoproteins by forming hydrogen bonds with the minimum global energy of -30.90, -22.62, -46.43, -28.82, -41.30 that prevents the binding of tumor suppressor proteins, restricts the transcriptional regulation of the viral episomes and inhibits the degradation of the apoptotic proteins which suggests the compound might be implemented as an anticancer therapeutic agent.

Keywords: Cancer, Viral Oncoproteins, Apigenin-7-O-β-D-glucuronide, Molecular Docking.

***

Effect of Polymer Properties on *Trichoderma Asperellum* Laccase Activity

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Abstract

There has been an increasing interest in enzyme engineering because of vital applications and necessity to preserve their activity. Polymers are often conjugated to proteins to improve stability. In the present study, fugal laccase was conjugated with various carbohydrate polymers and investigated for its influence and activity. The best laccase producing fungi *Trichoderma asperellum* was isolated and identified (18S rDNA). The three critical factor (pH, CuSO4 and wheat bran) were investigated for their interactive effects using Response Surface Methodology (RSM). Fractional Factorial Central Composite Design (FFCCD) was used for the optimization of laccase activity and maximum activity about 29 IU/ML was achieved. To address the loss of enzyme activity on successive runs, polymer conjugation was studied. The enzyme laccase was tested with three carbohydrate polymers such as chitosan (CS), Carboxymethyl cellulose (CMC) and co-polymer (chitosan-carboxymethyl cellulose CS-CSM) to study the effect of viscosity on enzyme activity. The CS-CMC blend/co-polymer has better protect the laccase activity than CS or CMC. Polymer viscosity measurement showed that viscosity was not significantly altered with laccase adherence. Effect of temperature on polymer shielded enzyme activity was studied and maximum laccase activity was well retained by chitosan at $40°C$.

Keywords: Polymers, viscosity, *Trichoderma asperellum*, Laccase, Response Surface Methodology (RSM)

***

Systems Biology: A Platform for Drug Discovery through Bioinformatics

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Abstract

Systems biology plays a major role in modern era of biological research. It paves many ways to biological researchers to carry out their researches easily and efficiently through its concepts such as gene network, metabolic pathways, disease network etc. These advances and improvement in computational facilities made drug discovery more powerful and saves time and money which we spent more in biological wet lab studies. Drug discovery is a time taking and tedious process which will long for years. Hence computational approaches are in use to reduce the time taken in drug discovery process. Bioinformatics plays a major role in the drug discovery process with the help of Systems biology. Recent bioinformatics techniques and approaches in drug discovery are discussed in this study. Techniques and approaches such as, targeting the disease by understanding metabolic pathway, understanding the disease mechanisms with the help of systems biology approaches, and drug combination prediction at systems biology level are shown and discussed in this study.

Keywords: Systems biology, Drug discovery, Bioinformatics, Metabolic pathways, Disease mechanisms.

***

Selection of Nano Catalysts for Biodiesel Production from Animal Fat

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Abstract

The improvement of alternative energy is primarily catalyzed by the negative environmental impacts and energy depletion caused by the excessive usage of fossil fuels. Biodiesel has emerged as a promising substitute because it is biodegradable, less toxic, and reduces greenhouse gas emission. Biodiesel is a good alternative fuel to petroleum diesel. In this regard, reliable and low-cost raw materials have increasingly drawn interest for biodiesel production, such as by-products of the meat- processing industries or waste animal fats.

Keywords: Bio diesel, Engine emission control, Animal fat.

***

Biofuel Production for a Sustainable Greener Environment - A Review

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Abstract

Biofuel production has been growing rapidly in recent years and new innovative methods of producing biofuels being developed today is an alternative for a sustainable greener environment. Biogas typically refers to a gas produced by the breakdown of organic matter in the absence of oxygen. It is a renewable energy source which is produced by the anaerobic digestion or fermentation of biodegradable materials such as manure, sewage, municipal waste, paper waste, food waste, plant materials etc. This review aims to evaluate the production capability of biogas and its application as an alternative energy source in rural and urban areas.

Keywords: Biofuel, Sustainable, Renewable, Greener environment, biodegradable.

***

Advanced Controllers in Bioprocess

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Abstract

Optimal environmental condition is required for cell growth and metabolic production in a bioreactor. Maintenance of sterile environment for growth, development and multiplication of organism for desired product is done with the help of controllers. Proportional Integral Controller is commonly used in a bioreactor. This Proportional Integral Controller has limiting function hence advanced controllers were developed. The advanced controllers include Fuzzy logic Controller, Adaptive Controller, Non linear Model Predictive Controller, Decoupled Input-Output Linearized Controller and Feed forward Artificial Neural Network Controller. The Adaptive Controller was developed to overcome the difficulty of finding the specific reaction rate, hence it is the most convenient controller to use with the known parameters. Among the advanced controllers the most efficient controller was found to be Model Predictive Controller in which the product quality is increased while the production cost is reduced. This Model Predictive Controller is Non linearised to increase efficiency.

Keywords: Fuzzy-logic, Adaptive, NMPC, DIOLC, FANN.

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Nanotechnology in Cancer Diagnostics and Treatment

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Abstract

Cancer is a disease caused by the uncontrolled cell division of abnormal cells in a part of the body. They grow continuously to form a mass of cells called tumor. There are different kinds of cancer namely Prostrate, Leukemia, Pancreatic, Breast, Liver, Lung etc. The nanotechnology advancements can be used to treat many types of cancer.In prostrate cancer, carbon nanotubes are used with laser irradiation to enhance treatment. Leukemia detection can be done easier with nanopore which includes fluorescent Anisotropic method. The incorporation of gold nanoparticles and iron oxide nanoparticles can help in potential imaging of pancreatic cancer. Gold nanocrystals are conjugated into antibodies to detect breast tumor cells. Super magnetic iron oxide nanoparticles are used as contrast agent in CT imaging to enhance the imaging of liver cancer. Hybrid nanoparticles are able to deliver multiple drugs used to target tumor cells for lung cancer.This review article cites the nanoparticles usage in various types of cancer and their progress among the other treatments of cancer.

Keywords: Nanoparticles, Nanodiagnostics, Imaging, Drug delivery, cancer therapy, hyperthermia

***

Thermal Biosensors and their Applications

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Abstract

In this paper we described the biosensors, their constructions and their various applications in various process. Thermal biosensors measures the heat energy released or absorbed in a biochemical reactions. Thermal biosensing is a universally used method. In recent days, researches are focussed on the removing of organic contaminants from the waste water. By using COD, we can find the organic contaminants in the waste water. COD is abbreviated as Chemical Oxygen Demand. It is defined as the number of oxygen equivalents consumed during the organic contaminant oxidation by strong oxidation agents. This thermal biosensor measures the heat released during this oxidation. Flow injection analysis is used along with the assays. Then other form of biosensor is MEMS Thermal biosensor. MEMS stands for Micro Electo Mechanical Systems. This technology allows integration and batch fabrication of miniaturized devices to create a bioanalytical device at low cost. Thermistor usually makes the systems operational stability to increase.

Keywords: Chemical Oxygen Demand; Flow Injection Analysis; Organic contaminants; Oxidation agents; MEMS

***

Antimicrobial Peptides from Plants and their Mode of Action

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Abstract

Anti-Microbial Peptides (AMPs) are the host defence peptides found in animals, humans, and plants. The AMPs obtained from animals and human cell lines are not only expensive but also tedious to extract. However, AMPs extracted from plant cells are both easier to extract and inexpensive. AMPs mediates the defence mechanism against bacteria by interacting with their cell wall. In the recent years, AMPs were isolated from various plant and their antibacterial activity were tested against many of bacterial species. This article critically reviews about AMPs extracted from various plant sources, mode of action, and their efficacy against bacterial species

Keywords: Plant AMPs , host defence , antibacterial activity , cell wall, plant sources, action

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Chemical Sciences and Technology

Removal of Cr(VI) from Waste Water using *Cocos nucifera* – Batch Studies

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Abstract

The presence of heavy metals in the environment is of major concern because of their toxicity, bio-accumulating tendency, threat to human life and the environment. Although all the heavy metal waste water treatment techniques can be employed to remove heavy metals, they have their inherent advantages and limitations. Among all these methods, adsorption process is considered better than other methods because of convenience, easy operation and simplicity of design. In the present paper, a new adsorbent i.e.*Cocos Nucifera* (coconut leave) is used for the removal of Cr(VI) from waste water. In order to study the effect of different parameters on adsorption process, batch adsorption experiments were carried out by varying different adsorption parameters. The influence of pH, contact time, initial chromium concentration and adsorbent dosage on the removal of Cr(VI) from the solutions and also the uptake capacity has been investigated. Experimental results were fitted to different adsorption kinetic model such as Pseudo first-order/Lagergren, First-order reversible, Ritchies second-order and Pseudo second-order kinetic model to find out the best fit. FTIR analysis and SEM image before and after adsorption were analyzed. The adsorption process was found to follow pseudo second-order kinetics. The best adsorption isotherm and rate controlling mechanism is also established.

Keywords: Cr(VI), Coconut leaves, uptake, kinetics, isotherm, FTIR, SEM.

Conversion of Alkaline Batteries into Fertilizers

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Abstract

The alkaline batteries were used all over the world by consumers. The used batteries have been thrown away as a waste into the land and this causes a major problem to environment. Related to many literature studies we go through over of enhancing plants growth by reducing zinc (Zn) deficiency in particular crops (corn). The government has also established the rules and regulations for a proper management of batteries (Batteries management and handling rules, 2001). The normal recycling processes are over going only on pyrometallurgical or hydrometallurgical recycling processes. But these recycling processes might cause major issues to atmospheric and to the environment by using some of chemicals or by burning processes. So the studies has been concentrated on converting of alkaline batteries into fertilizer by general shredding process and recovering of micronutrients such as Zn and Manganese dioxide powder (MnO_2) for field to grow plants in efficient as well as effective way. As per the studies we went through is recovering Zn and MnO_2 powder from alkaline batteries , are not consisting of any hazardous content or causing any other contaminants to the soil as well as to plant growth, it is the eco-friendly approach.

Keywords: Alkaline batteries, Recycling, Micronutrients (Zn and MnO_2), Enhancing crops growth, Eco-friendly.

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Anti Bacterial, Sem, Damage Probability and Beam Displacement Of Glycinium Maleate Nano Particles

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Abstract

Glycinium Maleate (GM) synthesized as nanoparticles by ball milling method is subjected to SEM study for morphological survey, anti bacterial activity for bio classification of sample in pharmaceutical use, Damage probability by LASERs and beam displacement for filter applications.

Keywords: GM, nano, SEM, Anti bacterial.

***

Use of Membrane Separation Technique for the Separation of Edible Oil and Solvent from Oil/Solvent Miscella

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Abstract

Membrane separation technology has gained rapid importance in almost allprocess industries. This technology can be employed as an alternative for some of the complex separation processes in food industries. Membrane separation technology was employed for the separation of oil and solvent from edible oil/n-hexane miscella. It is customary, in conventional solvent extraction process for edible oil extraction, to evaporate and condensate the solvent for its recovery, which requires a considerable amount of energy. It was intended to reduce the energy requirement for the separation of oil and solvent from the oil/solvent miscella. Hence, in this study, the separation of rice-bran oil/hexane miscella was prepared at a volume ratio of 1:1 and 1:2. The miscella was continuously fed to the membrane test cell withpolymeric membrane. The separation was carried out at pressures in the range of 250-400 psi. The effects of feed pressure and transmembrane pressure on total permeate flux, solvent flux, and oil flux were investigated. The results showed that the permeate flux increased with increase in transmebrane pressure but decrease with time of filtration. It was observed that the permeate flux decreased with increase in viscosity of the oil/hexane miscella, which varies with the volumetric ratio of the oil to hexane. From the results, it was noticed that with appropriate choice of membrane, the membrane separation process can be an effective and promising alternative method to separate oil and recover n-hexane in vegetable oil industries.

Keywords: Edible oil, miscella, Membrane Separation, n-hexane, Transmembrane Pressure.

***

Environmentally Benign Encapsulated Functional Ionic Liquids as Catalysts for Synthesis of Phenolic Compound Based Antioxidant

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Abstract

Present investigation is production of tert-butyl cresol (TBC) by reaction of tert-butylation with cresol using encapsulated functional ionic liquid. Ionic liquids have recently emerged as promising, benign and recoverable catalysts for many organic reactions. However, there are still a few problems in their use which come in the way of their commercialization. These problems are, escalated costs due to the need for high purification, hygroscopicity, their requirement in large quantities. This work was undertaken to overcome these problems. Highly dispersed ionic liquid catalysts were prepared through physical confinement or encapsulation of ionic liquids in a silica-gel matrix through a solgel process. Three ionic liquids, namely, (N-(4-sulfonic acid) butyl triethylammonium hydrogen sulfate), (1-(4-sulfonic acid) butylpyridinium hydrogen sulfate) and (1-(4-sulfonic acid) butyl-3-methylimidazolium hydrogen sulfate) were used to prepare the silica gel encapsulated catalysts. The loading of ionic liquids in silica gel was 5 - 30 % by weight. They were characterized by NMR, XRD, FTIR and SEM. Thermogravimetric analysis was carried out under inert. The analysis showed that they were thermally stable upto 324C. The catalysts were tested foractivity in production of antioxidant TBC in a batch reactor. The conversion of p-cresol was 80% using all the three encapsulated ionic liquids at a temperature of 70° with a maximum selective of TBC yield of 87% is achieved.

Keywords: Antioxidant, TBC, Ionic liquids, encapsulation.

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Techno-Economic Analysis for the Production of Ethanol from Sweet Potato

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Abstract

With the increase in the demand for alternative fuels, bioethanol is found to be suitable alternative for the fossil fuels. In the recent years, the demand for alternative have increased exponentially; in particular bioethanol from agriculture-based raw material is of greater interest. Significant amount of studies has been reported for the production of biofuels; none has reported the techno-economics analysis of the process. In this present study, the techno-economic analysis for the production of bioethanol from sweet potatoes is been discussed; with emphasis on the scale-up of process from lab scale to pilot plant scale with recycle. The entire analysis was performed using Intelligen SuperPro Designer. With the higher demand and emphasis for the environmental pollution - impact analysis was also carried out. The study achieves complete utilization of the raw material with minimal or no environmental risk. In addition, the simulation aims in construction of a self-sustainable plant for the production of ethanol.

Keywords: Alternative biofuels, techno-economic analysis, environmental impact analysis, ethanol, self-sustainable.

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Ultrasonic Assisted Activated Biomass (*Aloe barbadensis*) for The Amputation of Heavy Metals from Waste Water

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Abstract

Heavy metals remain as a major pollutant due to its enormous usage in commercial scale industries. Removal and recovery of heavy metals from industrial effluents is mandatory to meet the stringent rules, economic benefits and health of the community. This paper describes the adsorption of copper (II) ions from aqueous solution using raw biomass of aloe-vera (RBA) and ultrasonic -assisted activated biomass of aloe-vera (URBA). The operating parameters such as Ph, adsorbent dosage, time, initial ion concentration and temperature that influence the adsorption of heavy metals were investigated. The adsorption isotherms were investigated by Langmuir and Freundlich adsorption isotherm model. URBS showed better performance for the removal of copper (II) ions than the RBA. The thermodynamic parameters ($\triangle$G°, $\triangle$ H° and $\triangle$ S°) were calculated and the thermodynamic properties of copper(II) ions-URBA system indicates the process is exothermic.

Keywords: Heavy Metals, aloe-vera, Langmuir, Freundlich.

***

Quantum Dots- Applications and Recent Advancements

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Abstract

Quantum dots are Nano sized materials of size 1-3 nm which exhibit fluorescence when excited at certain wavelengths. QDs are classified based upon metal or material which is used as a precursor for the synthesis. Cadmium, Silicon, Carbon, and graphene quantum dots are the most prevalent nanodots that are by far reported in the literature. The versatility of these Nano dots such as fluorescence, highly tunable photoluminescence (PL) property, small size, biocompatibility, highly, exceptional multiphoton excitation (upconversion) property, electrochemiluminescence, ease to be functionalized with biomolecules, and chemical inertness paved a pathway to research community by employing them in semiconductor materials, optoelectronic devices, biosensors, cell imaging studies, bio labelling and in detection of ions or contaminants in waste water. This review paper will discuss on the newer approaches used for the synthesis of these quantum dots and their applications in the aforementioned areas.

Keywords: Quantum dots, Carbon dots, Graphene dots.

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Cellulose Extraction from *Proposis juliflora* as a Packaging Material

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Abstract

The species *Proposis juliflora* is highly available but considered as a curse for our nation. By seeing this species in an another prospective view in the field of paper production and packaging sector, this paper describes our ongoing research that is to extract cellulose from *Proposis juliflora*. The wood pulp of *Proposis juliflora* is grinded and undergoes series of process such as Ultrasonic extraction, Bleaching, Caustic extraction, neutralizing water treatment and Drying. Then the extracted cellulose is taken for qualitative and quantitative analysis. The results of the study found that the percentage efficiency of cellulose output from wood pulp of *Proposis juliflora* is 35%, whereas the other hardwood trees of forest which are used for paper production at present yields 40% cellulose. By avoiding wastages mechanically,*Proposis juliflora* is also made to meet 40% cellulose thereby it could completely replace the forest trees for paper production and prevents deforestation. According to the statistics, there is a presence of a *Proposis juliflora* tree for every meters in India. Eventhough it has huge availability, its utilization is 0%. Thus our paper proposes an idea to utilize it efficiently in Paper Production and Packaging sector by making use of the cellulose content in it.

Keywords: Paper Production, Ultrasonicator, Bleaching, Analysis.

***

Crystal Violet Dye Removal Using Activated Carbon *Leucaene leucocephala* by Adsorption Method

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Abstract

A low- cost and eco- friendly activated carbon was prepared from the pods of Leucaene leucocephala and treated as a carbon material for the removal of Crystal Violet (CV) dye from aqueous solution. Batch adsorption studies were carried out by varying the initial concentration of dye solution, initial pH of the solution, adsorbent dosage and temperature. The results obtained from this study were interpreted in terms of Langmuir adsorption isotherm and Freundlich adsorption isotherm. Scanning Electron Microscopy (SEM) image of activated carbon Leucaene leucocephala was monitored before and after adsorption of CV dye molecules. The percentage removal of CV dye molecules was found to be increases with decreasing initial concentration of dye solution, increasing initial pH of the solution, increasing adsorbent dosage and increasing temperature. Thus, activated carbon Leucaene leucocephala can be employed as a good carbon material for the removal of Crystal Violet dye from an aqueous solution.

Keywords: Adsorbent, Activated carbon, Crystal Violet dye, adsorption isotherm.

***

Ag/TiO_2 Nanocomposite: Synthesis, Characterization, Photocatalytic and Antimicrobial Activities

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Abstract

In this work, we report the synthesis, photo catalytic and antimicrobial activities of Ag/TiO_2 Nanocomposites prepared by easy, cost effective and less harmful co-precipitation method. The yield of the product is also good when compared to other methods. They were characterized by UV, XRD, FE-SEM and EDAX techniques. The X-ray diffraction (XRD) spectra reveal single phase anatase structure for the samples, formation of uniform spherical Ag doped TiO_2 nanocomposite is ascertained from the surface morphology of FE-SEM. From EDAX, metal composition is observed as Ag-2.33%, 2.72%, 7.90% and Ti-43.62%, 62.30%, 50.97%. The photocatalytic activity of the composite is tested with Rhodamine B dye, Ag-TiO2 sample degraded the Rhodamine B dye (25ppm) in 150 min indicates good photocatalytic activity. An enhancement in bactericidal activity is also observed against bacterial strains Pseudomonousaeruginosa and serratia with increased Ag substitution. Pseudomonousaeruginosa exhibited good bactericidal effect than serratia.

Keywords: Nanocomposites, photocatalytic activity, Rhodamine B dye, Pseudomonousaeruginosa, serratia.

***

Optimizing the Activation Process of Red Mud for Cadmium (II) Adsorption - Comparison of the Results from Response Surface Methodology and Artificial Neural Network

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Response surface methodology (RSM) is the generally used as statistical tool to model and analyze the experimental data. Recently, artificial neural network (ANN) is attracting the attention of researchers to predict the results accurately. In the present work, RSM and ANN were used as modelling tools for evaluating and predicting the results of activation process of red mud. calcination temperature, calcination time, acid concentration and activation time were taken as parameters for activating the red mud. The activated red mud (industrial waste) was used as adsorbent to remove Cadmium (II) from aqueous solution. The effect of these parameters on activation of red mud for adsorption of cadmium was studied through four factor, two level Central Composite Design (CCD). The same set of generated data from CCD was utilized for ANN. Regression co-efficient (R2), root mean square error (RMSE) of the two methodologies were compared to predict the capability of adsorption. The results show that the ANN model is more accurate in prediction than RSM.

Keywords: RSM, CCD, ANN, red mud, Cadmium (II).

***

Green Synthesis of Silver Nanoparticles from Different Plants and Identifying its Anti-Bacterial Activity

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Abstract

Nanotechnology and Nanoscience is the emerging field in todays research world. It has wider application for the field of medicine, cosmetics, electrical, electronics and so on. In the field of medicine it is used for drug delivery, preparation of new drugs, anti-microbial activity and also used in cancer therapy. There are many metals based nanoparticles, among those silver nanoparticles have more potential anti-microbial and anti-cancer properties. Plant mediated synthesized silver nanoparticles have less or non-toxicity when compared to chemically synthesized silver nanoparticles. Green synthesis of silver nanoparticles is very cheap and easy to produce. They are eco-friendly in nature. This study reveals that green synthesis of silver nanoparticles from various plants (Cassia auriculata, Murraya koenigii, Piper betle, Mentha piperita, Azadirachta indica, Emblica officinalis, Psidium guajava, Syzygium cumini, Ocimum sanctum, Musa paradisiaca) with the help of silver nitrate solution. Then undergo characterization (UV-Visible spectroscopy, XRD analysis, FTIR analysis, SEM analysis etc) for the conformation of synthesized silver nanoparticles. Finally check the anti-bacterial efficiency of the synthesized silver nanoparticles by agar well diffusion method.

Keywords: Nanobiotechnology, Nanoscience, Nanoparticles.

***

Experimental Analysis on Pulp and Paper Industry Wastewater by Ozonation

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The quality of wastewater that is discharged into the environment is to be improved due to the scarcity of water. Pulp and paper sector currently ranks fourth for its water usage and it is also one of the biggest manufacturers of wastewater. Paper and pulp industry Wastewater is considered as a severe environmental risk when it is untreated or badly treated before discharge into receiving waters because of the presence of toxic substances. Contaminants inherent to paper and pulp wastewater include effluent solids, sediments, absorbable organic halides (AOX), chlorinated organic compounds, chemical oxygen demand (COD), biological oxygen demand (BOD), contaminants, thermal loads, microorganisms such as coliform groups and toxic chemicals. A formal method for handling paper and pulp wastewater includes physical, chemical, and/or biological processes, or in some instances, a combination of these operations is used. Current wastewater treatment technologies are deemed ineffective in the utter removal of pollutants, particularly organic matter. In many instances, these organic compounds are resistant to conventional treatment methods, therefore creating the requirement for modern engineering sciences. This report delineates the effect of ozonation by investigating the removal efficiency of color and COD. The experimentation is conducted in a lab scale with the reaction time of 180 and 120 minutes. The effect of ozonation treatment on SCOD release is optimum at the dosage of 60% at 90 minutes. The maximum COD solubilization was achieved as 65% and also the removal efficiency of color is attained as 100%. This analysis is being proposed to resolve the challenges in removing a wide range of contaminants and for better uses of economic resources.

Keywords: Ozonation, Wastewater Treatment, COD, Pulp and Paper Industry, SS reduction.

***

Experimental Investigation of Solar Bio-mass Integrated Dryer System

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This paper presents the design, construction and performance of a mixed-mode solar dryer for food preservation. The mixed mode includes a solar collector and biomass burner which can function independently or simultaneously. In the dryer, the heated air from a separate solar collector is passed through a grain bed, and at the same time, the drying cabinet absorbs solar energy directly through the transparent walls and roof. The results obtained during the test period revealed that the temperatures inside the dryer and solar collector were much higher than the ambient temperature during most hours of the day-light. The temperature rise inside the drying cabinet was 74% higher for about three hours immediately after 12.00 (noon). The dryer exhibited sufficient ability to dry food items rapidly to the required moisture level and simultaneously ensures a superior quality of the dried product.

Keywords: solar collector, solar dryer, biomass, solar intensity, cabinet.

***

Synthesis and Characterization of Polymeric Membranes

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Membrane technology has become a dignified separation process over the past four decades. The main force of membrane technology is the fact that it works without addition of chemicals, with a relatively low energy use with easy and well-arranged process conditions. The principle is quite simple that the membrane acts as a very specific filter that will let the influent to flow through, while it catches suspended solids and other substances (cakes). Cellulose acetate and poly vinyl alcohol membrane was fabricated using immersion precipitation technique. Cellulose acetate is first dissolved in dimethyl sulphoxide and heated for two hours followed by the dissolution of poly vinyl alcohol for next two hours. The solution is then allowed to cool at room temperature and is cast on a glass plate. Then SiO_2 is impregnated in the prepared membrane. Municipal waste water is collected and sent for preliminary analysis. Glycerol was chosen as the cross linking agent. The fabricated membrane is placed in a membrane reactor for treating waste water. Nitrogen gas was used to effect the separation. The membrane before and after usage is characterized. (Permeation flux, SEM analysis, Contact angle, Pore diameter, Pore size). Parameters like Turbidity, COD, BOD and pH were investigated for the treated water samples. This process has significant importance in waste water treatment, desalination and water purification process.

Keywords: Membrane fabrication, Cellulose acetate, Poly vinyl alcohol, waste water treatment .

***

Study on Biodegradable Non-Wovens as Upper Layer for Sanitary Napkins

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This project deals with the analysis of using biodegradable non wovens as top layer for sanitary napkins. Commercial sanitary napkin is made up of 80% of plastics and takes nearly 500-800 years to degrade in landfills. It also releases toxic gases on burning. So this project aims at utilizing Viscose and bamboo spun lace non woven for the top layer of the sanitary napkin. These non wovens will be tested for overall moisture management capability, Wetting time, absorption rate, maximum wetted radius, spreading speed, one way transport index. The results are expected to reveal the suitability for top layer of a sanitary napkin. Thus this project focuses mainly on eco-friendliness and sustainable development.

Keywords: Viscose, Bamboo, spun lace non woven, top layer characterization, Sanitary napkins .

***

Development of Women Wear Using Coir Fiber and its Blends For Handloom Weavers

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This project aims at development of womens wear using coir fiber and its blends with other natural fibers such as Linen(waste),organic cotton, Bamboo for enhancing livelihood of handloom weavers. The coir fibers will be softened using suitable chemicals and the softened coir fiber will be blended with above mentioned other fibers Linen(waste),organic cotton, Bamboo in the ratio of 50:50.The blended fibers should be made into suitable yarn through open end spinning system for a suitable count.Then the produced blended yarns will be made into woven and knitted womens wear. The woven fabric will be made in handlooms. The produced woven and knitted fabric will be dyed, finished and tested for comfort properties such as Thermal, water vapor and air permeability.

Keywords: Coir fiber, Handloom waevers.

***

Vapour-Liquid Equilibria Modelling Based on Excess Gibbs Free Energy Equations Applied to Binary Azeotropic Systems at 101.325 KPA

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Knowledge of precise vapor-liquid equilibria is a requirement to the detailed design of distillation equipment. However, such data is limited, and usually not available when new systems are under consideration, because it is complex and laborious to obtain the data experimentally. Predictive methods are therefore valuable for process evaluation and design. In this paper five binary azeotropes namely Acetone-water, Acetone-methanol, Ethanol-water, Ethanol-benzene, and Methanol-water were taken. The experimental vapour liquid equilibrium data determination for this system was carried out using Othmer type ebuilliometer in laboratory scale at atmospheric pressure. For the theoretical prediction of VLE five activity coefficient models namely NRTL, UNIQUAC, UNIFAC and modified form of florry-huggins equations (SRS and TCRS) have been employed. The parameters for the five systems of four models namely NRTL, UNIQUAC SRS and TCRS were computed using Newton Raphson technique. UNIFAC model was adopted using Analytical solution of group contribution (ASOG) method. Also these models are validated using thermodynamic consistency test. The performance of these models are tested and reported.

Keywords: Vapour liquid Equilibrium, Azeotrope, Non ideal system, Activity Coefficient model, Thermodynamic consistency.

***

Bacterial Leaching of Heavy Metals from Sewage Sludge: Studies on pH Optimization

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Bioleaching is an environmentally-friendly proven method to remove heavy metals from heavy metal contaminated wastes. This process is significantly influenced by medium pH. The objective of this work is to find out an optimum pH for effective removal of heavy metals from sewage sludge through bioleaching. The sludge was collected from municipal waste water accumulated area, Addis Ababa, Ethiopia. The bacteria, Acidithiobacillus ferrooxidans (NCIM 5371), was obtained from National Collection of Industrial Microorganisms, India. The experiments were carried out in 250 mL Erlenmeyer flasks with different initial pH values at temperature 30 C. The attainment of bioleaching of heavy metals was examined for the period of 20 days. Changes in the pH and ROP were also analyzed. It was observed that the high pH reduction, absence of lag phase and improved heavy metal solubilization were obtained in the experiment conducted with initial pH 3.0. The bioleaching efficiency is distinctly correlated with pH and ORP. Primary heavy metals concentration in the original sludge and residual heavy metals concentration in bioleached sludge were analyzed by EDX. It revealed that the effective removal of heavy metals was achieved at initial pH 3.0. Such a study helps for designing a successful bio-detoxification system.

Keywords: Sludge, Acidithiobacillus ferrooxidans, pH, bioleaching, heavy metals.

***

Eco-friendly Mosquito Repellent Fabric using Dye Derived from *Curcuma aromatica*

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In the present study the mosquito repellent activity was evaluated on ecofriendly dyed fabric. The dye was extracted from two different plant parts viz., rhizome of *Curcuma aromatica* and fruits of *Terminalia chebula* using methanol and water respectively. The cloth was dyed using both extracts and tested for mosquito repellent activity in various soaking time intervals and colour fasting ability. The fabrics fixed the dye very efficiently when mordanted with fruit extract of *T. chebula*. The originality of natural colour was fixed well when the extract accompanied with natural mordant. These fabrics are induced for mosquito repellency test using a simple excito chamber. The results showed the methonolic extract of *C. aromatica* performed well in mosquito repellency activity at maximum hour of soaking interval i.e 8hrs of soaking period showed 95% repellency when compared with water extract. The dyeing efficiency was also found to be higher in methanolic extract when compared with water extract.

Keywords: *Curcuma aromatica*, fabrics, excito chamber, mordants, repellency test.

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Ruthenium(II) Complexes of Benzothiazolamine Schiff Bases: Synthesis, Characterization and *in-vitro* Cytotoxicity

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Four new Ruthenium(II) complexes were synthesized from the metal precursors of the type [RuHCl(CO)(EPh3)3] (where E= P/As) with monobasic tridentate benzothiazolyl Schiff base ligands. Structural features of the ligands and its ruthenium(II) complexes were determined by various physico-chemical methods and spectral (IR, UV-Vis and NMR) techniques. An octahedral geometry has been tentatively assigned for all the complexes. The in vitro cytotoxic activity of the ligands and complexes were screened by the panel of bacteria and the selected cancer cell line. The growth inhibition activity of the ligands and complexes reveals that the complexes possesses higher cytotoxic activity than the respective ligands.

Keywords: Ruthenium (II), benzothiazolamine, cytotoxicity.

***

Study on Drying Characteristics of Guava Leaves

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Psidium guajava L., popularly known as Guava belonging to Myrtle family is grown in tropical and subtropical climatic regions. Guava leaves has been used as medicine for various health benefits in several countries. In the present investigation, the efforts have been made to prepare the powder of Guava Leaves by applying different drying technique viz. Tray drying, Vacuum drying and Hot air oven drying. The drying was done at different temperatures 50C, 60C and 70C. At a temperature, the Vacuum dryer took maximum time for complete drying of Guava leaves followed by Hot air oven and Tray dryer. Maximum moisture content was removed from fresh Guava leaves using Tray dryer whereas for the other dryers it varied with temperature. As temperature increased from 50C to 70C, the drying rate increased and hence the removal of moisture. The studies indicated that Tray drying was faster and effective in the removal of moisture. Through all the techniques, at various temperatures the chlorophyll content of the leaves were noted and is observed that, the highest value in Vacuum Oven and Tray dryer is at 600C.

Keywords: Guava, Tray dryer, Vacuum dryer, Hot air oven.

***

Heat Transfer Studies and Development of Nusselt Number Correlation Using Al2o3CMC and SA-Based Nanofluid on Plate Type Heat Exchanger

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Thermal performance studies on PHE was conducted using different non-newtonian nanofluid pertains Al2O3 as nanoparticles in two different base fluid such as aqueous carboxymethyl cellulose (CMC) and sodium alginate (SA). The current work implies that there is a significant enhancement in heat transfer between hot utility (water) and two different base fluids in a plate type heat exchanger (PHE) using nanoparticle. Non-newtonian nanofluid was prepared using Al2O3 in the concentration range of 0.01 and 0.05 weight%. Non-newtonian nanofluid (cold utility) and water were operated in both parallel and countercurrent flow pattern in PHE. The thermal analysis was carried out to determine the effectiveness of PHE and cold fluid Reynolds number, for the different flow rate of cold fluid (2 to 8 lpm) and different concentration of base fluid as 0.01%, 0.05% and 0.1 weight%. The result shows that, effectiveness of PHE increases with increase in the nanofluid concentration and cold fluid flow rate, but it decreases with increase in the concentration of non-newtonian fluid. It was found that the SA-based nanofluid shown better heat transfer enhancement compared to CMC-based nanofluid. The Nusselt number correlations was developed using the least square regression analysis for the estimation of heat transfer coefficient in non-newtonian nanofluid. The correlation found to have a low RMS value of 2.032 for CMC system and 2.58 for SA system.

Keywords: Carboxymethyl cellulose, Sodium alginate, Non-newtonian, Nano particle, Alumina.

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Commercial Utilization Of UV Protectant Properties Of Marine Seaweeds As A Green Cool Roof Against Temperate Regions

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Biostimulant properties of macro algae are explored for use in agriculture and the antimicrobial activities for the development of novel antibiotics. Macroalgae contains lots of poly phenols and other compounds that possess antioxidant activities. Hence it has a capacity to act against the damaging effect of UV radiation. The extraction was prepared from the different seaweeds using soxhlet apparatus, then the agar diffusion assay was performed for antimicrobial activity. Further antioxidant activity was performed using DPPH and FRAP assay. The anti-microbial activity of the seaweed extracts were found to be high in Padina tetrastomatica (11mm), Steochospermum marginatum (11mm), Dictyota bartayresiana (13mm) compared to other seaweeds. The antioxidant assay revealed that results of Halymenia dilatata (28.4000.889), Hypnea new seaweed (12.6730.710) and Padina tetrastromatica (14.4070.651) showed highest antioxidant activity than the other seaweed extracts. In present study the methanol extract of the different Indian red and brown seaweeds were evaluated for their UV protection activity to formulate green cool roof. In sun protection factor, Steochospermum marginatum shows high SPF value 5.6 than other seaweeds and screened to 4 seaweeds. The UV protection properties were analyzed using pot analysis and blood parameters for 4 seaweeds. In pot analysis, Steochospermum marginatum and Padina tetrastromatica showed high UV protection activity than the other two seaweed extracts by measuring the seed germination, length of the root and height of the Vinga radiata (green gram) plants and screened to 2 seaweeds and seaweed consortia. The blood parameters such as RBC, WBC, HGB, HCT, MCV, MCH, MCHC, RDW, PLT, MPV, PDW and PLT were counted using the hematology analyzer in whole blood before and after UV treatment. The seaweed consortia remains showed high UV protection activity and other seaweeds showed minimum UV protection activity. From the predicted result the paint coated seaweeds were formulated as cool roof adsorbing UV radiation as well as sun rays protection.

Keywords: Biostimulant - UV radiation - antioxidant - roof.

***

Recent Advancement In Eviction Of Pollutants Using Graphite as An Adsorbent

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Rapidly growing Pharmaceutical industries and other activities have been discharging copious amounts of organic, inorganic, bio-degradable and Non biodegradable waste in to the environment. Pharmaceutical effluents have been identified as Emerging pollutants greatly polluting the water streams, causing significant hazard to aquatic life systems and human beings. Recently, the bilge has been observed in waste waters, surface, ground and drinking water sources. Long term exposure to the different classes of Pharmaceutical compounds even at low concentration ranges such as micro gram per liter to nano gram per liter may cause endocrine disruption and inhibition of cell proliferation in humans. Its presence in drinking water can have adverse effects on human health and ecosystem. There are several methods for the removal of contaminants includes Chemical oxidation, Bio degradation, Liquid extraction, Adsorption, Membrane separation etc., among these, Adsorption is the most effective method. Graphite is taken as an adsorbent and is converted to Graphene oxide by Hummers method and Modified Hummers method. Adsorption is carried out by Batch and Continuous process. The basic parameters like pH, concentration, dosage and adsorption rate is determined. The adsorbent is characterized using FESEM, EDAX and FTIR. Further the research is in progress through various kinetic studies.

Keywords: Adsorption, Adsorbent, Graphite, Hummers Method.

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Adsorption Of Pollutant Using Synthesized Adsorbent

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The promising properties together with the ease of processiblity and functionalization make graphene base material ideal candidates for incorporation into a variety of materials. The evolution of various methods available for the preparation of graphene, such as Hummers method, Modified Hummers Method, Chemical Vapour Deposition Method, Mechanical Exfoliation Method, Thermal Exfoliation Method in which Hummers Method has been enabled to carry the process under low cost of adsorbent to expunge the pollutant and which is characterized by XRD, FTIR, SEM, EDAX etc. The adsorbent act as a base material for the future purification of water, super capacitors and as a composite in antibacterial activities and solar cells and coatings which will end up with high adsorption capacity to remove the emerging contaminants.

Keywords: Adsorption, Adsorbent, Graphite, Hummers Method.

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Current approaches for synthesis of Chitosan Nanoparticles and its applications.

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Nanotechnology has the capacity to manipulate material at the atomic level. It plays a vital role in the progress of the advanced drug delivery system. Biopolymer based nanoparticles were used for delivery of various therapeutic molecules due to its biodegradability, low toxicity and bioavailability etc., Among various biopolymers Chitosan is gaining more attention due to its broad applications and high efficiency towards antimicrobial, antioxidant, anti-inflammatory, anticholesterolemic and anticancer activity. In addition to this chitosan is the second most abundant biopolymer and it can be effectively modified to sponges, film, capsules, microspheres. To acquire a Nano-carrier for therapeutic use, a different materials and various methods of preparation has been attempted. But the conventional methods for nanoparticle preparation have certain drawbacks such as expensive, need non-renewable energy resources as raw material and may generate environmental pollutants. In order to overcome this green synthesis of nanoparticles achieving importance. This review focuses on the various methods for preparation of chitosan nanoparticles and its applications in various fields.

Keywords: Nanotechnology, Biopolymer, Chitosan, Green synthesis.

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Impact Of Ultrasound On Desulfurization Of Fuel Using Oxidative Desulfurization Process: A Review

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Production of ultralow sulfur fuel becomes the requirement of all fuel consuming industries to meet the environmental legislation. Hydrodesulfurization is the worldwide used desulfurization technique in industry which deals with high temperature and pressure and face difficulty in removing aromatic sulfur content such as benzothiophene, dibenzothiophene and alkyl substituted thiopehenic compounds. To reduce the cost of traditional process, ultrasound assisted oxidative desulfurization (UAODS) technique is proposed which is operating at mild condition with low operating cost and higher safety. Ultrasound irradiation increases the rate and thus reduce the process complexity and cost. The objective behind this study is to investigate findings, progress of UAODS and effectiveness of ultrasonication on desulfurization efficiency. The effects of individual process parameters like reaction time, temperature, catalyst dosage, concentration of oxidants, role of phase transfer agent, type of extractant, type of S compounds, initial sulfur content, pH of aqueous phase, Ultrasonic power, frequency and mechanism of ultrasound are described. Effect of process on properties of fuel, fuel quality and recovery are also described. Finally, the extraction parameters like extraction time and temperature, IL to fuel ratio, regeneration and recycling of ionic liquid, number of extraction steps and future scope of work to enhance the performance of this technology are reported. This review wil be helpful to all fuel consuming industries.

Keywords: Ultrasound, Fuel, Oxidation, Extraction, Separation.

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Evaluation Of Pollution Parameters In Poultry Wastewater From Local Chicken Shops

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Poultry waste water from the local chicken shop was collected and the quantitative analysis for the determination of pollution parameter was attempted. Analysis of Poultry processing waste water from local chicken shops was resulted in a way that the effluent was highly contaminated with the pollutants than the permissible level. Quantitative analysis was done to determine the pH, Total suspended solids, Total dissolved solids, Biological Oxygen Demand, Chemical Oxygen Demand, Oil and Grease, Nitrate and Phosphate levels in the Water taken for processing and the wastewater released into the drain. The pH 6.8 & 9.2, TSS 08& 328 (mg/L), TDS 1296 & 1544 (mg/L), BOD ¡ 2.0 & 602 (mg/L) , COD 08 & 815 (mg/L), Oil & Grease ¡ 1.0 & 14.0 (mg/L), Nitrate 0.14 & 12.69 (ppm) and Phosphate 0.04 & 19.81(ppm) are the levels for water sample and effluent sample respectively., The results of the pollution parameter analysis on the water taken for processing showed an increased range when compared with Indian Standard specification for drinking water. The study with an objective of comparative studies on quality parameter evaluation of water used for processing and effluent collected after processing and to bring out suggestion over the effluent processing. The pollution parameter study was done in-order to maintain the soil free from pollution parameters and to bring out some suggestions which can be a solution on effluent processing like Bioremediation, Electrocoagulation etc., Therefore, The best suggestion is the effluent water should not be allowed to mix with the municipal drain system without pre-treatment meeting sewage standards as per the Indian Standards.

Keywords: BOD, COD, Effluent Treatment, Waste Management

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Microwave Drying Of Plant Materials

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Drying is one of the conventional process to dry the plant sources in order to increase the shelf life and also available throughout the year without any quality degradation. There are so many drying methods and techniques available to dry the plant materials. Among the various drying methods, microwave drying method is one of the drying method which could be used in now a days. The microwave drying method is not only reduces the drying time by enhancing the drying rate but also maintain the quality of the dried plant materials. The microwave drying distributes the uniform thermal energy inside the cavity of the microwave and it reaches the inner surface of the plant materials in a shorter period of time and prevent the degradation of materials due to thermal effect.

Keywords: Drying; Microwave; Plant; Thermal.

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A Study On Physico Chemical Parameters Of Textile Effluents In Salem City And Its Impacts On Environment

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Globally, textile industries play an important role in financial value of the country. They use huge volumes of water in various processes of fabrics and large quantity of it is discarded with heavy loads of pollutants in environment. The present study is aimed at assessing the physico-chemical characteristics of textile effluents from different areas of Salem city. The parameters such as colour, pH, total Hardness, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Dissolved solids (TDS), Total Suspended Solids (TSS), Chlorides, Oil and Grease were analysed. The results showed the colour of the effluents were in the range 5-10 hazen, pH was between 8.50- 8.70, total Hardness of 440- 1420 mg/L, BOD was in the range of 111-1500 mg/l, COD was 549 4630 mg/l, TDS is 3375 - 17740 mg/l, TSS was 58 -396 mg/L, chloride was 821- 4780 mg/L, oil and grease was 37 468 mg/l. All the parameters are found to be above the permissible limits as mentioned by Bureau of Indian standards. (BIS). The high value of the pollutants shows that the effluents are discarded without proper treatment which may provoke hazardous effects on terrestrial and aquatic ecology and poses potential threats to the local environment. Although many conventional effluent treatment methods are implemented in many places, additional technologies still need to be developed for the complete removal of the pollution load.

Keywords: Textile effluents / physicochemical parameters / Bureau of Indian standards / Pollutants / ecosystem.

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Weight Reduction Of Hyundai Santro Disc Brake Calliper

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In the various vital parts of an automobile, brake holds a crucial phase in the overall performance of the vehicle. Disc brakes are nowadays used widely in all four wheelers. In India four wheelers come with front disc and rear drum brake system. Since disc brakes are considered to be more efficient than drum brakes all cars are to be replaced with disc in both the drives in near future. Light weight and high performance are the criterion that every Engineer tries to attain in his design. The concept of value engineering also emphasizes the same. We were given this project by the MANDa product development department engineers for reducing the weight of a cylinder caliper which fits in the disc brake assembly. MANDa brake systems India limited is a premier company manufacturing complete braking systems to Hyundai Motor India limited and Mahindra and Mahindra limited. We were taught to use the principle of value engineering to reduce the overall weight of the component but not to compromise on the reliability of the braking system. We started the project by modeling the component in CATlA to high degree of accuracy. Later we made an analysis of the same component in CATIA. We extracted the results and make a trial and error variation of trivial regions in the solid model. Thus we made a suggestion of the redesign which would be considered by the engineers to implement the overall weight reduction .In this paper the impact of FEM on the design process and the ease with which successive iterations are performed is indicated.

Keywords: FEM, Brake, CATIA.

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The effect of Plasma treatment on the dyeability of Cotton fabric using novel natural colorants

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Huge demand is currently on for the natural dyes in the present context of environmental issues. Natural dyes can produce a special aesthetic value that is environmentally friendly and gives added value to textile production. This paper aims to study the dyeing behaviour of plasma treated cotton fabric with natural colourants extracted from from Curcuma longa and Piper betle and with natural mordants by pre, simultaneous and post-mordanting processes. The approach in this study is based on Green Chemistry principles and sustainable development concepts since no hazardous chemicals were used in the process.

Keywords: Cotton, Plasma, Natural Colourants, Mordants, Eco-friendly.

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Biosensors For Food Allergens Detection

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In recent times food allergy is considered as one of the major health threats for sensitized individuals all over the world and, over the years, significant efforts and investments have been made by food industry to offer safe foods for allergic consumers. It is the need of the hour ,as everyone depends on a rapid, sensitive and reliable methods for tracing food allergens in commodities . So that one can minimise the risk associated with the presence of hidden allergens in food.The allergic reactions due to food falls under the category of type 1 hypersensitivity.Severe allergic reactions lead to anaphylaxis which is a life threatening allergic response which affects the whole body. Repeated exposure to the food allergens results in the risk of more severe anaphylaxis.

Keywords: Biosensor; food allergens; QCM; aptamers; fret sensing; gluten; anaphylaxis

Membrane Bioreactor Application For Treatment Of Textile Effluent

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Waste water from textile industry is the most prevailing problem that have been faced recently. It is estimated that nearly 10000 different dyes and 7x10^5tonnes are used annually worldwide. Nearly two lakhs tonnes effluent are released annually. The dyes should be treated before discharging into the environment because it is highly toxic and contains carcinogenic substance like aromatic compounds/hydrocarbons. There are no distinct way in which the effluent can be 100% recovered without any toxic and carcinogenic substance which cause high danger to environment. They show severe effects at low concentration i.e. high toxicity. Membrane Bioreactor(MBR) is the only solution to this problem because it is highly effective and low cost process. There are many recent innovation and membrane cost reduction will enabled to use this technique more nowadays.Membrane bioreactor is the integrated form of biological degradation of organic and inorganic contaminants using membrane filtration. Membrane bioreactor is quite efficient than conventional bioreactor due to its distinct advantages. Though it has various advantages, there is a major drawback in MBR that is membrane fouling which decreases the lifespan of MBR. In this review paper we discussed about the various treatment of textile effluent, their working principle, and the application of membrane bioreactor and also the drawback of membrane bioreactor along with the way of controlling the membrane fouling. Further research aspects are considered for feasible process to treat the textile effluent.

Keywords: Effluent, toxic, carcinogenic, membrane bioreactor (MBR), fouling

Membrane Bioreactor Application for Industrial Wastewater Treatment

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Membrane bioreactor technology (MBR) an efficient advancement for the waste water treatment. The combination of activated sludge involving micro and ultra-filtration is a feasible way for the treatment. This review article gives an insight overview of the application of membrane bio reactor for the industrial waste water treatment. The waste water involves various residual organic, inorganic components and it may vary according to nature of the source. Several risk factors are involved in the operation of this technology of which fouling is the major one that can be reduced using the fouling reducers such as the activated carbon. The technology has been advanced from optimization to developments in architectural designing of the bioreactors. This article summarizes the techniques, recent trends and approaches towards the membrane bioreactor application in industries for waste water treatment.

Keywords: recent trends of MBR, application, techniques, risk factors.

Preparation of Halloysite based nanocomposites and their Physio-Chemical Characterization

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Halloysites are types of naturally occurring multi walled alumina silicates with 1:1 sheet arrangement and with the recent advent in technology, they have found multifarious applications and in each application, nanoclay helps to improve the quality of product, economize on the cost and saves the environment. The structural, morphological and physiochemical properties of Halloysite nanoclays, Zinc oxide, Halloysite Nano Tube- Zinc oxide nano particle are studied. The degradation potential of the syntheized nanoparticle is analysed using Methylene Blue dye. The environmental application of the study was identified as degradation of ammonia in surface water. The standard graph for ammonia degradation studies using UV spectrophotometer have been plotted. The synthesis and characterisation of ZnO nanoflowers are completed. The characteristic study of the synthesized nanocomposite was performed using TEM, SEM and XRD methodologies. The synthesized nanocomposite was used for the degradation study of Methylene Blue and ammonia dissolved in deionised water.

Keywords: Nanocomposite; Halloysite nanotube; Ammonia degradation; HNT-ZnO nanocomposite; characterisation.

Food Sciences and Technology

Transglutaminase Cross-Linked With Casein and Gelatin Coating for Fruits and Vegetables

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Abstract

There is an increased demand for extended shelf life, fresh and minimally processed fruits and vegetables by the consumers. Hence the purpose of the present study was to examine the effect of the edible coating prepared with transglutaminase enzyme, casein and gelatin on selected fruits and vegetables. In the present study mangos, tomatoes and carrots were used as samples. Three types of samples were prepared. Sample one (S1) was coated with the TGE alone (0.1%), sample two (S2) was coated with TGE (0.1%), casein (2.5%) and gelatin (7.5%) and sample three (S3) was coated with TGE (0.1%) and gelatin (10%). The reference food sample (R) was not coated with any substance. All samples were then stored at room temperature and observed for 15 days. On 15^{th} day, it was noticed that S1-coated with TGE alone was found to have better weight retention and organoleptic properties than S2, S3 and R. It is concluded that TGE based edible coating enhances the freshness of fruit and vegetables.

Keywords: Edible coating, Transglutaminase, Shelf life, Organoleptic, Weight.

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Effect of *Phaseolus vulgaris* (kidney bean) on Glycaemic Response of Idli - a cereal and legume based indian fermented food

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Abstract

The prevalence of diabetes is increasing rapidly across the world, particularly in Asian countries. This has necessitated the development of hypoglycemic foods. In this study, the effect of selected ingredient was to improve the nutritional and glycaemic index of idli by substitution of kidney bean in idli batter. Fasting blood glucose level was taken and post prandial blood glucose level (at 30 min interval till 2 hours) was checked with bread as standard to assess the glycaemic index of control idli and developed idli. Based on the overall results of both textural and sensory parameters, the present data suggest that kidney bean could be substituted up to a level of 5% and 40% in idli batter to develop organoleptically acceptable breakfast food. The nutritional composition of the optimized idli has revealed that idli is simple breakfast food with beneficial compounds such as proteins, carbohydrates, essential amino acids. A strong positive correlation was observed between glycaemic index and *Phaseolus vulgaris* incorporated idli when compared to control idli. From the results it is possible to identify food preparations in the traditional Indian diet having attributes of desired glycaemic effect, delayed peak rise, low glucose response curves. However in the present study, value added idli has better hypoglycaemic effect than control idli.

Keywords: Kidney bean, Glycaemic index, Textural parameters, Sensorial parameters.

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Effect of Drying Methods and Infusion of Functional Ingredients on the Quality Characteristics of Coconut-based Snack

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Abstract

Natural versatile ingredients like beet root, carrot, ginger and mint have been chosen for the recent study in terms of their effective bioactive composition as osmotic infusions in the form of filtrates. Sliced matured coconut samples of thickness 0.80.1mm were subjected to osmotic dehydration for a period from 0 min to 720 min at room temperature and the slices were dried in a hot-air oven at temperature 45-60°C for about 6-7 hours and freeze drying at temperature (-40 to 30 °C) for a duration of 14-16 hours. Osmotic medium without the infusion of filtrates of functional ingredients serves as the control. The dehydrated samples were packed in Aluminium foil laminated LDPE pouches with infusion of 100% nitrogen gas composition and stored at ambient temperature till analyzing the phytochemical characteristics. The phytochemicals detected in the sample impregnated with filtrate of *Mentha piperita* were caffeic acid, rosmarinic acid, hesperedin, apigenin and luteolin. The samples impregnated with Zingiber officinale were possessing phytonutrients like myricetin (T2-43.1; T1-38), apigenin (T2 -28.8; T1-21.6), caffeic acid (T2 -20.9; T1-18.4), curcumin (T2-7.1; T1-6.5), quercetin (T2-2.9; T1-2.8), cineole (T2-2.0; T1-1.89) and gingerol (T2-0.93; T1-0.78). The presence of phytochemicals in the sample impregnated with *Beta vulgaris* filtrate were found to be betanin, isobetanin, betacyanin, betaxanthin and vulgaxanthin. The order of presence of phytochemicals in the sample impregnated with *Daucus carota* filtrate were kaempferol (T2-12.6; T1-11.6), luteolin (T2-4.1; T1-3.2), quercetin (T2-3.4; T1-3.3), lutein (T2-3.6; T1-3.2) and zeaxanthin (T2-0.07; T1-0.06). Freeze dried samples were found to contain comparatively greater pack of phytochemicals than hot air oven dried samples due to its conservative effects which was observed significant at $p \leq 0.05$ level when compared with control.

Keywords: Osmotic dehydration, coconuts, phytonutrients, impregnation, antioxidants.

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Optimization of Process Parameters for the Osmotic Dehydration of Banana in Sugar Solution

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Abstract

In this work, osmotic dehydration of banana was carried out using sugar solution. Response surface methodology was used to determine the optimum processing conditions that yield maximum water loss and weight reduction and minimum solid gain during osmotic dehydration of banana in sugar solution. The experiments were conducted according to Central Composite Design (CCD). The independent process variables for osmotic dehydration process were temperature (25 - 45 °C, processing time (30 -150 minutes), sugar concentration (20 - 60% w/w) and solution to sample to ratio (5:1 - 25:1 w/w).The osmotic dehydration process was optimized for water loss, solute gain, and weight reduction. The optimum conditions were found to be: temperature - 37°, immersion time 100 min, sugar concentration - 45% w/w and solution to sample ratio 14.5:1 w/w. At this optimum point, water loss, solid gain and weight reduction were found to be 34.2 (g/100 g fresh sample), 9.2 (g/100 g fresh sample) and 25(g/100 g fresh sample) respectively.

Keywords: Osmotic dehydration, coconuts, phytonutrients, impregnation, antioxidants.

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Fortification of Fiber in yogurt using High Fiber Banana Stem

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Abstract

Yogurt is considered as a healthy food and incorporating dietary fiber will make it even healthier. Banana Stem Fiber (BSF) is a good source of dietary fiber. The effect of fortification with BSF on fresh yogurt was investigated. Acidity, pH, color, texture profile, sensory properties, and consumer acceptance were studied. Control yogurt (without fiber) and fortified yogurt with 5%, 10% and 15% BSF were prepared. Fortification with BSF did not cause significant changes in yogurt acidity, although pH was increased. Yogurts fortified with BSF found to be firmer in texture (higher hardness values) and light in color. Consumer test results indicated that the appearance, color, and flavor ratings were significantly affected by fiber fortification. Yogurt fortified with up to 5% BSF had similar sourness, sweetness, firmness, smoothness, and overall acceptance ratings as the control yogurt. Sensory ratings and acceptability of yogurt decreased significantly when increasing BSF to 15%. Further addition of 5% vanilla with 5% BSF fortified yogurt increased the flavor and produced acceptable yogurt with beneficial health effects.

Keywords: Yogurt, Banana Stem Fiber, Fortification, Sensory Evaluation

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Quality Assessment and Shelf Life Evaluation of *Momordica charantia* Based Candies

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Abstract

Candies were prepared with four different combinations of Trial - 1 (*M. charantia* blanched with water), Trial - 2 (*M. charantia* blanched with beet root juice), Trial - 3 (*M. charantia* in powdered form) and Trial - 4 (*M. charantia* treated with honey). To establish the best product, the prepared candies were assessed by organoleptic evaluation through Nine-point Hedonic scale. Out of the four trials, two best candies of interest was selected and stored at room temperature (35°C) to evaluate its shelf life. The microbial growth in the prepared sample was analyzed at regular intervals for every ten days for a period of two months. The experimental results showed that Trial - 3 and 4 were the most preferred candies by the panel members. Moreover, to preserve the food products from the environmental pathogens, the product was packed for the consumers better interest. The changes in consumer preference for safe food had led to innovation in packaging technologies. Packaging method was designed with the usage of instant gel powder along with glycerin, which helped to make the foods safer with better shelf life.

Keywords: *Momordica charantia*, Bitter gourd, Candy, Organoleptic evaluation, shelf life

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Production and Quality Evaluation of Herbal Wine

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Abstract

Nature provides profuse package of nutrients, antioxidants and when incorporated with novel foods contributes increased therapeutic value. Versatile plant based produce like aloe Vera, grapes, palm sugar and fermenting agents like yeast is required to develop wine in different variations such as V1(0.5:3:1:0.3), V2(0.75:3:1:0.3) with different ratio of aloe Vera, grapes, palm sugar and wheat grass with 5g of yeast to each. Sensory panel members have selected the best product variation V2 than V1 and control in terms of nutritional, physico-chemical, anti-oxidant and shelf-life analysis. Aloe Vera and grapes were pre-processed, the gel is extracted from aloe Vera and blended with grape, sugar and then supplemented with additives to maintain the pH for favorable yeast growth during fermentation. Later the ageing of wine was done for a certain period in an oak wood barrel to develop the maturation of wine. The study, it was observed that V2 wine has highest sensory score (4.8). It was found statistically significance difference existed between control and variation-2 considering nutritional parameters at 5% level. Whereas, antioxidants like vitamin C content (41.1mg) and antioxidants activity of V2 (70.2) was greater than the control (14mg and 21.3). The variation was also found to be high stable at room temperature without any preservatives. From the study, it was concluded that variation-2 was selected as the best of other variation and control. The wine was good in term of TSS, acidity, ash, moisture and alcohol. Proximate nutrient like energy, carbohydrates and minerals possessed almost similar values with control. The final total microbial count of aloe Vera grapes wine was 1102(cfu/ml) respectively on the 90 days of the storage life comparatively lesser than the control. This is highly stable in room temperature without any preservatives. The product wine V2 has met standards and recommendation of FSSAI and has the potential on commercialization worldwide.

Keywords: Aloe vera, Grapes, Fermentation, Wine

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Bioactive Components Enriched Fermented Whey Beverage Development and its Physiochemical Assessment during Storage

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Abstract

Nutraceuticals are bioactive compounds providing health benifits apart from basic nutrition, which is usually provided in Supplement form that is not affordable by all the people. Hereby, The Anthocyanin which is a Bioactive compound having antioxidant properties is optimized in Whey and allowed to ferment producing Fermented Whey Beverage. The Anthocyanin was incorporated into the pasteurized and Homogenized Whey in different proportions such as 20mg, 40mg, 60mg, 80mg and 100mg. The *Lactobacillus acidophilus, Lactobacillus bulgaricus* and *Streptococcus thermophilus* were added in combined manner for Fermentation, with an incubation period of 10 hours at 37°C. The Physiochemical Parameters such as Titratable acidity, pH, Total Soluble Solids, Anthocyanin, Viscosity and Microbiological parameters were evaluated during the storage period of 2 weeks. The Sensory Analysis was done as per 9 Point Hedonic Scale. The results of the study found that Titratable acidity gets increased, whereas the Anthocyanin, PH and Total Soluble Solids were reduced with the storage period of 2 weeks. There was a reduction in bacterial colony count during storage due to reduction of PH. Sensory attributes such as flavor, color and taste of Fermented Whey enriched with 7.5% Anthocyanin was superior. Thus, by the addition of Anthocyanin in Whey, not only the Whey gets utilized, but also it serves as an affordable carrier of bioactive compounds to consumers.

Keywords: Anthocyanin, Sensory Analysis, Titratable Acidity

***

Development of Fruit based Cereal Bar and Analysing Quality

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Abstract

Cereal bar is made of various cereals like rice, Corn, Oats and sugar syrup with dried fruits and flavours. As the cereals have nutritive value, it will be a value added product. The amount of carbohydrates in rice is high and it its the most abundant and dependent food in South India(TamilNadu). Corn has Niacin and thiamine content. This product also helps the malnourished people with required nutrient in an innovative product format which aim to produce more calories intake by humans and also serve as a snack product for children. The product obtained in bar form is of desired consistency and a balanced taste of cereals and fruits. The product is prepared by first making a binding syrup of the required brix and blending the combination of cereals and dried fruits and cutting to the required shape and size. Regarding the sensory analysis it is given a positive feedback on the key attributes like texture, flavor,overall taste,sensory and overall acceptance also higher.

Keywords: Cereal bar, texture, flavor, overall taste, sensory

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Comparison Modeling of Moisture Removal Technique for *Averrhoa bilimbi*

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Abstract

Fruits and vegetables embrace an important role among the health food as they provide significant amount of nutrients, especially vitamins, minerals, fiber, sugars and antioxidants as well as its refreshing and thirst quenching behavior. Due to high likely to decay in nature and short shelf life period of fruits, immediate processing and storing products become essential to avoid post-harvest losses. In this project, *Averrhoa bilimbi* was selected due to attribution of its Medicinal uses, which include mixtures against cough, mumps, rheumatism, pimples and scurvy. The extract of bilimbi fruit has high levels ofoxalic acid, and therefore may be used to remove iron-rust stains from clothes and to impart shine to brassware. To increase the shelf life of the fruit for its availability throughout the year, preservation technique is carried out with different timeintervals and temperatures in this project. Whereas the technique includes, dehydration method such as Convectional dehydration, for shortening the drying time without degradation of final quality of the dried product .The further process is performed to model the proposed moisture removal method for the selected fruit *Averrhoa bilimbi* is carried out to identify the best drying values for storage of the fruit and developing into a product.

Keywords: *Averrhoa bilimbi*, shelf life;convection method;drying time; model.

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Studies on Sensorial and Nutritional Properties of Biscuits using Composite Protein Rich Flours

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Abstract

Nowadays people tend to consume snacks that contribute to high calorie which leads to ill effects such as obesity, stress, tiredness etc. Bakery products contribute insignificantly to rise in carbohydrate levels which in turn leads to obesity.Biscuit is a small baked unleavened cake, typically crisp, flat, and sweet. Among the baked products biscuit is being consumed by a major population. Our objective is to replace carbohydrate rich flours with flours less in carbohydrates and high in protein and to compare the nutritional and sensorial properties of the biscuits with control sample.

Keywords: Obesity, Carbohydrate level, Nutritional and sensorial properties.

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Value added products from *Hibiscus rosasinensis*

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Abstract

Hibiscus Rosa Sinensis possess many properties and this plant may produced at large scale for providing herbal alternative to many diseases. It contains nutrient content like energy, protein, fat, calcium, phosphorous, potassium, iron, vitamin c and antioxidant like total phenol and flavanoid. It possess Antioxidant property , anticancerous property and may help to Lower Blood Pressure and Lower Blood Fat Levels. Today lifestyle is moving to consume ready to eat foods like baked goods. The objective is to study the organoleptic property, radical scavenging activity and nutritional content of the Incorporated Hibiscus Rosa Sinensis biscuits and also to optimize the extraction process of the Hibiscus Rosa Sinensis extract.

Keywords: *Hibiscus Rosa Sinensis*, organoleptic, Antioxidant property , anticancerous property.

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Review on Non-diary based Ice Cream with Fortification

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Ice cream is a complex food colloid that consists of an unfrozen serum phase, ice crystals, fat globules and air bubbles. The main ingredients of ice cream are fat, milk, solid-non-fat, sucrose, stabilizers and emulsifiers. Generally ice cream is liked by everyone. But dairy based milk cannot be consumed by people with lactose intolerance. The effects such as stomach pain, bloating, diarrhea, head ache, etc are caused by lactose malabsorption. Thus we have chosen peanut milk and coconut milk as a milk substitute. As coconut milk has high fat content, increase in taste, texture and viscosity has been observed. The aim of this paper is to formulate a non-dairy based ice cream using peanut and coconut milk and to fortify it with herbs, as ice cream will be a good carrier for herbs to increase the nutrient content and to study the physiochemical properties, microbiological quality of the ice cream.

Keywords: Fortification, herbs, Coconut, peanut milk, Physiochemical properties.

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Influence of Wall Material on Microencapsulation of *Nigella Sativa* Seed Oil

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Abstract

Encapsulation is a process by which small particles of core products are packaged within a wall materialto form microcapsules.*Nigella sativa* seed oil have a wide variety of biological activities and therapeutic properties, microencapsulation process by freeze drying using different wall material will protect the functional component of *Nigella sativa* seed oil from chemical and biological degradation. Wall material maltodextrin and gum acacia was used as encapsulating material in the ratio of oil-wall material was 1:1 and 1:1.5. The microencapsulation effectivenesswas determined in base of process yield and the microencapsulation efficiency. Highest encapsulation was higher in maltodextrin (92.6 $\pm$ 0.23%) and oil was encapsulated at 67%. The impact of wall material on *Nigella sativa* oil was determined and the prepared emulsion was characterized through zeta potential particle size analyzer and viscosity measurements and a morphological characterization of microcapsules was performed by scanning electron microscope.

Keywords: Microencapsulation; Freeze Drying; Maltodextrin; SEM; *Nigella sativa* Oil.

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Fabrication of Automatic Biscuit Cutter

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Abstract

Sheeting and cutting in biscuit processing is the most popular way of forming pieces of dough from fermented or developed dough, and in some instances for the short dough. Our objective is to manufacture biscuit cutter machine without low operating cost and to reduce the operating time in medium scale industry. The machines main objective is to sheet and cut the dough using wire cutter. This biscuit cutter is designed for the uniform cutting of biscuits before baking. Hopper, Rubber cover roller, Connecting rod, Round shaped mould, Wire cutter and Pulley were some of the components of the machine. First the biscuit dough is sheeted using rubber covered roller and then the dough is cut using wire cutting method with accurate shape. The dough is cut by using wire cutters and AC motor. This machine is mainly designed for domestic purpose. This machine reduces the man power and increases the efficiency of production.

Keywords: Fabrication, biscuit, sheeting, cutting.

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Formulation of Ice Cream From Peanut (*Arachis Hypogaea*) Milk

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Abstract

Ice cream is a frozen sweetened product made out of heat treated mix consisting of edible fat and milk solids with or without other ingredients and permitted additives. In this study Peanut Milk *arachishypogaea* was used as the main source for the preparation of Ice Cream. For that Peanut Milk Ice Cream, physico-chemical, nutritional quality and sensory evaluation was carried out. Peanut milk was rich in proteins, fibers, polyphenols, antioxidants, vitamins and minerals which can be added as a functional ingredient to the ice cream. The study was divided in to 2 phases. First phase deals with the collection of raw material (whole milk, peanut milk, fresh cream & other additives) and preparation of ice-cream was done by six different trials(control, A, B, C, D & E). Pasteurization was performed to inactivate the enzymes and microbes present in peanut milk. All the above ingredients are mixed well and it was filled in air tight container. Then it is stored in freezer condition at -5°C. Second phase deals with the analysis of physico-chemical property, nutritional quality and sensory evaluation. From the result, it has been found that the incorporated .According to the sensory analysis, the aroma, taste and flavour of peanut milk ice cream trial D was scoring higher than other trials. In future, Peanut milk ice cream will be available in wide range of flavors.

Keywords: Ice Cream, Peanut milk, Fat, Trials, Pasteurization, Physico-chemical, nutrient analysis and Commercial value.

***

Development of Value Added Health Mix with Pumpkin Seeds and Almonds

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Abstract

Mental health includes our emotional, psychological and social well being. Globally, an estimated 322 million people were affected by depression in 2015 as said by WHO in 2015.A multivitamin supplement is never going to replace the things missing in the diet to its fullest. Pumpkin seeds and almonds have many beneficial effects as it contains antioxidants, vitamins, polyphenols and unsaturated fatty acids that becomes protective against the development of cognitive decline and depression. A number of well- controlled depression treatment studies have found therapeutic benefits following n-3 supplementation. Nuts and seed powders can be used as nutritional supplements in the production of various instant food mixes that are ready to cook and in great demand presently. Majority of the health mixes are made from different cereals and pulses. Value added health mix was developed using pumpkin seeds and almonds with three variations. They were variation-1 (pumpkin seeds-40g, almonds-20g), variation-II (pumpkin seeds-30g, almonds-30g) and variation-III (pumpkin seeds-20g, almonds-40g). The standardized best value added health mix (variation-I)was evaluated for sensory quality, physicochemical, nutritional characteristics, cost effectiveness, consumer acceptability and popularization with respect to control. The organoleptic scores for variation-1 got the highest mean score for all sensory attributes. The proximate properties and the physico-chemical and the storage stability have contributed favorable results. Free samples were provided to random customers visiting supermarkets and showed positive results. Hence the value added health mix could be a best naturally flavored health mix for all age groups.

Keywords: Health mix, antioxidants, pumpkin seeds, almonds.

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Effect of Silver Nanoparticles of *Ulva fasciata* in Germination of Selected Pulses

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Abstract

In this study, an eco friendly approach was applied for synthesis of silver nanoparticles from the seaweed of *Ulva fasciata* aqueous extract. SNPs of Ulva fasciata used as reducing agent and tested their effects on seed germination. Biologically synthesized Ag NPs were applied to evaluate the effect on seed germination and seedling growth of *Vigna unguiculata, Vigna radiata* and *Cicer arietinum*. Seeds were treated with different concentrations of Ag NPs (50%, 75% and 100%) and compared with control. The results of above experiment revealed that the Ag NPs enhanced the considerable germination in *Vigna unguiculata, Vigna radiata* and *Cicer arietinum* as 50%, 75% and 75% respectively and the parameter seedling growth was found to be higher at 50% conc. AgNPs as 3.6 cm in *Vigna unguiculata* and the seedling growth of *Cicer arietinum* was higher at 100% concentration of AgNPs as 2.52 cm. So the present study is useful to explore the potential of green synthesized silver nanoparticles on germination and seedling growth of selected pulses.

Keywords: Silver nanoparticles, *Ulva fasciata*, Seed germination, seedling growth.

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Efficiency Rate of Zero Waste Utilisation of Tubers

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Abstract

Fruits and vegetables are the most utilized among all Foods. Globally, 1.3 billion tonnes of food gets washed every year. Out of which, 40-50% is contributed by fruits and vegetables. Our survey has revealed the fact that some difficulty occurs in the minimal processing of tubers. The processing of huge amount of tubers manually is time consuming. Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed, such that the tuber cutting operation can be done without application of any impact force. Also Complete utilization of the tubers is very important .The ideology of ZERO WASTAGE UNIT is not only to minimize the waste production, but also to extract the maximum By-product from a given sample and to increase the time efficiency. By doing this not only the vitamins and minerals, but also phytochemicals present in the peel can be utilised. This plant, if commercialised will be of great use to the farmers as well as common people and will help them with their time management and financial crisis.

Keywords: Zero wastage unit , Phytochemicals , Tubers , Impact force.

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Effect of Hydrocooling and Application of Anti-Microbial Extract on Quality Attributes of Selected Tropical Fruits

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Abstract

Tropical fruits such as Mangoes and Sapota are highly perishable which makes it mandatory to subject them to cooling. On the other hand, Edible antimicrobial coating has emerged as a major criterion to reduce Post-Harvest losses. The present work was aimed to develop Hydrocooling technique and to determine the effect of use of antimicrobial extract on Mangoes and Sapota stored at ambient and Low Temperature storage. Fruits such as mango and Sapota with and without neem leaf extract were cooled using Hydrocooling system. The Core Temperature of Fruits during cooling was recorded and it was found that for mangoes the core temperature was reaching to 20-25°C and that for Sapota it was 14-16°C. Cooling time for Mango and Sapota was 40 and 20 mins respectively. Physical analysis which includes Percentage loss in weight (PLW), Chemical analysis which includes Total Soluble Solids (TSS), pH and Microbial analysis were carried out at regular intervals for fruits stored at recommended storage temperature. Hydrocooling of fruit Mango and Sapota at 14°C and 20 °C using anti-microbial extract, wrapped in LDPE pouches stored at low temperature and attained a maximum shelf life of 25 days and 16 days compared to control (without extract). There was no much significant effect of coating on quality attributes of fruits but significant effect on microbial quality of stored fruits.

Keywords: Hydrocooling, Anti-microbial extract, cooling time,Percentage loss in weight (PLW), Total Soluble Solids (TSS).

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Quality Evaluation of Coating on Sapota

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Abstract

To study the effect of coating and cooling on storage quality of Sapota. The physical and chemical characteristics of the fruit have immense significance as they ultimately affect the quality of processed products prepared from them. Over ripening of Sapota (*Manilkarazapota*) fruits at the post-harvest stage usually results in dramatic decline in quality. In the present study, chemical analysis which includes Total Soluble Solids (TSS), Sugars and microbial analysis includes Total Plate Count (TPC) of Aloe Vera coated Sapota fruits. The precoat was prepared using Aloe Vera gel. Aloe Vera gel is an edible coating.Edible coatings are environmentally friendly that is applied on many products to control moisture transfer. gas exchange or oxidation processes. Edible coatings can provide additional protective coating to produce and can also give the same effect as modified atmosphere storage in modifying internal gas composition. One major advantage of using edible films and coatings is that several active ingredients can be incorporated into the polymer matrix and consumed with the food.Thus, enhancing safety or even nutritional and sensory attributes. The use of different edible coatings (polysaccharides, proteins, lipids and composite) as carriers functional ingredients on fresh fruits and Vegetables is to maximize their quality and shelf life.The fruits were dipped in precoat solution for 5 minutes and is air dried. The coated Sapotas were stored in two different conditions/equipment and observed. Here, one bunch of coated Sapotas were packed in LDPE bags and stored at refrigerated temperature and another bunch of coated Sapotas were stored in fruit preserver equipment without packaging and these were studied at regular intervals on every 2nd day. The dip treatment of Aloe Vera coating was useful in retaining the chemical and microbial characteristics when compared to other treatment methods. This treatment was found to be the best and most effective treatment in maintaining the fruit quality attributes and providing shelf life extension for about one month.

Keywords: Sapotas, Shelf life extension, Aloe Vera gel.

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Physico-chemical Composition, Sensory and Shelf-life Quality of Value-added Pizza Base

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Abstract

The prevalence of degenerative diseases could be in check and control by including dynamic composition of ingredients can considerably enhance the therapeutic value of these foods. Value added Pizza base was enriched with arrow root powder, chia seed powder and subject it to acceptability in comparision to control. In the present study, variation 1 (V1) made with the addition of functional ingredients like arrowroot flour, wheat flour and flax seed flour (25, 15, 20g), variation 2 (V2) made (15, 25,25g), each 5 g of chia seed and milk powder was added to variation 1 & 2, and various parameters like sensory, physico-chemical, nutritional and shelf-life were investigated. A considerable improvement in sensory characteristics was observed upon addition of the functional ingredients and based on overall acceptability, V1 was selected as the best. Physical parameters and physico-chemical traits and nutritional parameters like energy, protein, fat, carbohydrate, fiber, calcium showed significant difference (p0.05) between control and value added pizza base. The total microbial load of the control and V1 pizza base revealed that no count was observed at 0th day, whereas at 15th day, there observed 1103(cfu/gm) which was considered negligible and didnt affect the product quality. The value added pizza which was incorporated with functional ingredients like flaxseed and chia Seeds are high in omega-3 fatty acids and antioxidants. Value added pizza base was much better than the standard pizza base as it is rich in nutrients like energy, carbohydrate, protein, fiber, calcium. It is highly nutritious and acceptable and it was formulated into various recipes by using the new food processing techniques.The value added pizza could be endorsed as a best snack food for all age group of people from childhood to elderly.

Keywords: pizza base, flax seeds, chia seeds, sensory and physico-chemical quality.

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Design and Fabrication of Three Dimensional Printer for Food Printing

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Abstract

The upcoming technology of rapid prototyping in the field of food technology has led to the origin of 3D technology for food printing in the convenient and hygienic manner moreover the idea of tailored made foods has given boost of this technology for further development and adaptation in food industries particularly food restaurants to save time and resources. The ability of 3D printing technology to use different types of ingredients provides it a unique feature to customize food as per ones nutrient requirements. The system. Design consists of a user interface, 3d printing software to design the food and subsequent machines to dispense and print the food on a platform. Different techniques are available to print the food as per the raw materials and ingredients used. However, the technology is still eating weaning stage but it promises great potential to produce nutrient specific and cost effective food products in a near future. This review article discusses the basic Principle, materials used and various techniques for 3d printing of food.

Keywords: rapid prototyping, food printing, tailored foods, interface 3D printing.

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Production of Extruded Products using Millets and Amarphophallus paeoniifolius (elephant foot yam) Flour

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Abstract

The study was performed to evaluate the drying characteristics of*Amarphophallus paeoniifolius* (elephant foot yam) by oven drying. Flour was obtained from dried elephant foot yam .The noodles were developed from elephant foot yam flour, finger millet, pearl millet and wheat. The cooking quality like water absorption capacity, cooking loss and volume increase were studied. Proximate analysis like carbohydrate,protein, fat, mineral and moisture were studied .The noodles developed from the combination of above flours possess good organoleptic property.The noodles developed from elephant foot yam can be consumed by all aged groups including diabetic patients because of low glycemic content of elephant foot yam. *Amarphophallus paeoniifolius* flour and millet flour was prepared by using Tray dry and roll crusher. Noodle was formulated using various millet and *Amarphophallus paeoniifolius* flour at different proportions. Cooking quality, physiochemical properties, nutritional profile, sensory attributes, cost and marketing potential of formulated noodles was evaluated.The present research highlights that, composition of noodleswith *Amarphophallus paeoniifolius* flour, millet flour, and wheatflour was succeeded in cookingproperties such as blending with tastemaker, leaching of ingredients, water absorption indexand textural properties. Sensory evaluation results from semi-trained panellists provide that *Amarphophallus paeoniifolius* flour, finger millet and wheat flour has given higher acceptance over other compositions.From the results of cooking quality of formulated noodles, when millet and *Amarphophallus paeoniifolius* flour are used, it loses stability and leaches on cooking. Its been overcome by adding wheat flour as stabilizing agent.

Keywords: *Amarphophallus paeoniifolius*, noodles, flour, wheat.

***

Identification of Food Adulterants in Some Selected Food Items using Chemical Qualitative Analysis

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Abstract

Food is one of the basic needs for every living being and very important for life. Now a days foods are affected by different adulterants. Adulterants are the foreign substance which is added to the food in order to get profit, those adulterants reduces the quality of food. Some of the common adulterants are mineral oils, castor oils in edible oils; vanaspathi, mashed potatoes in ghee; inverted sugar or jaggery in honey, kesari dhal, lead chromate in pulses etc. which can lead to harmful health effects such as Cardiac arrest, Anemia, Paralysis, brain damage, Cancer etc. Food adulteration is a major global issue due to which the developing countries are at higher risk since there is a lack of monitoring policies.The present work is the attempt of adulterant based investigation instead of technique based study, where the qualitative detection for the presence of adulterants from daily used food materials like Milk, Butter, Edible Oil, Honey, Ghee, Milk powder, Tumeric powder, Rice and Maida were carried out. The food samples were collected from different local grocery stores around Coimbatore and assessed for the presence of adulterants by chemical qualitative analysis. The chemical analysis was carried out by following standard procedure given by food safety (FSSAI).

Keywords: Food adulterants, chemical analysis, FSSAI, daily food products.

***

Preliminary Analysis of Toxic Metal Contaminants in Common Food Products by Laboratory Chemical Reagents

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Abstract

A normal human diet contains many chemical elements which are essential for human life but some heavy metals also present in the food items due to environmental pollution. Toxic metal analysis of food products is of major importance due to the raised consumer awareness and it is a need of an hour to evaluate and eradicate the presence of toxic trace elements in the food products. Toxic elements such as mercury, arsenic, cadmium, and lead, also termed as heavy metals, can destroy mental and central nervous system functioning and also severe damages to human kind. A qualitative assessment of heavy metal contamination (Cd, As, Pb and Hg) in some of the selected food samples collected from nearby local shops was done using simple laboratory chemical reagents. In the present work, the food products like Chocolates, Chilli Powder, Turmeric Powder, Rice, Wheat Bread , Health Drink Powders and Sugar were taken to analyze presence of toxic metal. The purpose of the present work is to analyze the toxic metals present in the food samples using simple technique and to bring awareness to the public on the study of toxic metals.

Keywords: Toxic Metals, Harmful Diseases, Chemical Analysis, Consumer Awareness.

***

Sensory and Textural Properties of Gluten based Chewing Gum

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Abstract

The wheat gluten was used and the developed chewing gum shows satisfactory result. The texture of the chewing gum was less hard than the commercial synthetic gums with value of 209.691 N and329.843 N respectively. The chewiness and springiness of gluten chewing gum was 0.135 and 2.035 respectively which was higher on comparing with market chewing gum. The gluten chewing gum was also found that it is rich in protein and less in fat and sugar level of 25.30%, 0.83%, and 58.81% respectively. The protein was higher, fat and sugar was found to be lower on comparing with synthetic chewing gum. The chewiness of 0.135 and 0.005 for gluten chewing gum and synthetic gluten gum respectively says gluten gum was good to chew. Hence, the final product suits best for consumption on comparing with synthetic gums.

Keywords: gluten, natural gum, gluten chewing gum, texture profile analysis, protein rich.

***

Effect of Honey on Functional Compounds and Sensory Attributes of Natural Amla(*Emblica officinalis* Gaertn) Milk shake

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Abstract

In this paper, an attempt made on development of ready- to - drink milk shake enriched with vitamin C and other functional compounds. Freshly extracted amla juice in 5 different concentrations from 8.34 to 10.44 was mixed with remaining mixture of honey and milk at 10°C. Analysis like Total Soluble Solids (TSS), pH, acidity, ascorbic acid, total protein content, total sugar content, total phenol contentand total tannin content along with sensory attributes such as colour, taste, flavor and Overall Acceptability (OAA) of the samples performed. The results showed that OAA and other functional compounds were found to be good for sample 4 containing, 77.51% milk and approximately equal quantity of amla juice and honey. There was not a significant difference in the functional compounds at $P \leq 0.05\%$ for sample 4 with other samples. The functional compounds enriched milk shake as a natural product with extended shelf life weredeveloped and validated for regular consumption.

Keywords: Amla, Functional compound, Honey, Milk shake,Sensory attributes1

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Relationship between Mother's Nutritional Knowledge, Awareness, Practice and Growth of Pre-School Children in Rural Communities

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Abstract

Cultivation of a Healthy eating pattern for a child act as the backbone for the Nutritional Status of the child. Development of Recommended Nutrtional Status of the child will decrease all the retardation problems and aids to prevent long term syndromes. To attain the requird Nutritional Status of a child, Mother of the child plays a key role by developing a healthy eating pattern for the child. This study is carried out to identify the Relationship between Mothers Nutritional Knowledge, Awareness, Practice and Growth of Pre-school Children in Rural Communities. The work was done for 700 children between 2-5 years in the rural area of Salem district,Tamilnadu. In this study, both qualitative and quantitative research methods were used. The Anthropometric measurements of the children were taken and assessed. A detailed questionnaire was completed by the mothers of each sample. The results were analysed statistically. The result showed that the Economic Status of the family have a strong impact on childs nutritional status.

Keywords: Nutrition; Knowledge;Practice; Awareness.

***

Development of Biosweetned Ice-Cream for Type-2 Diabetic Patient

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Abstract

The aim of the study was to design and develop the innovative sweetened product for the patients of type-2 diabetic patients (Non insulin dependent diabetic patients). Statistical analysis reveals that type -2 diabetic was found among the adults (Onset diabetes). Normally adults are fond of sweet products, but the adults suffering from type-2 diabetes miss the chance of taking sweet products because of the high blood glucose (sugar) level. The body of the patients with type 2 diabetes mellitus unable to secrete and use enough insulin properly. They suffer with the symptoms of increased thirst, increased hunger, dry mouth, frequent urination, fatigue etc,This new product development was designed to keep an end to the problems faced by the patients of type 2 diabetes. The new product designed satisfies the feel of type 2 diabetic patients since it is a sweet based product Ready to eat -Biosweetned ice cream and it can be made with different flavors. The sweetened used for the preparation of ice cream is natural, medicinal herb. It is selected because it has no effect on zero calories and it is 300 times sweeter than sugar .The quantity of stevia (*Stevia rebaudiana*) added was as per FDA policy i.e in GRAS (Generally Recognized as Safe). Hence this new product "Ready to eat Biosweetned ice cream" is targeted to the pre- diabetic and type 2 diabetic patients because the ingredients in the formulation of Biosweetned ice cream was known to boosts up the insulin secretion and satisfies their urge towards sweet based products.

Keywords: Type 2 diabetes; New product formulation; Bio sweetener.

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Development of Therapeutic RTS

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Abstract

RTS is a beverage made from blending of natural extracts from fruits and vegetables. The current situation is that consumption of sugar-sweetened beverages has been linked to risks for obesity, diabetes, and cardio vascular diseases, therefore can replace consumption of soft drinks. The development of *Hibiscus* juice will be a valuable produce for health benefits. *Hibiscus* and Aloe vera gives a palatable taste enhancing therapeutic behavior of the product. Blending of both the ingredients gives good taste with medicinal property. It can be consumed in the form of drink which can replace the carbonated drinks. *Hibiscus* is edible and delicious. Consumption of this gives relief from high blood pressure and cholesterol. The combination of the above mentioned extracts as RTS will serve as a therapeutic thirst quencher for any season.

Keywords: *Hibiscus*, Aloe vera, Ginger, RTS beverage, thirst quencher.

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Development of omega-3 enriched Traditional Indian Sweet

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Abstract

Studies in India have shown that the frequency of coronary artery disease is increasing at an alarming rate. Increasing the consumption of omega (ω)-3 fatty acids may be a particularly powerful dietary strategy to combat CAD. Omega-6 and omega-3 polyunsaturated fatty acids (PUFAs) are essential fatty acids that must be derived from the diet, cannot be made by humans, and other mammals because of the lack of endogenous enzymes for ω-3 desaturation.A 2g of ALA is found in 30 g of flaxseed fibre. The benefits of ALA are seen at intakes as low as 1g/day and 2g/day is recommended for a cardio protective effect. Laddu is a traditional recipe of Indian foods with different compositions and combinations,the present study was planned to develop convenient snack food rich in omega-3 fatty acids and subjected to sensory evaluation using 9 point hedonic scale rating method.

Keywords: *Hibiscus*, Aloe vera, Ginger, RTS beverage, thirst quencher.

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Imaging Techniques in Food Processing

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Abstract

Food safety and quality maintenance are inevitable part in food processing industries. Quality assessment is based on various parameters such as color, texture, aroma, sweetness,firmness etc., Earlier days, the quality assessment was done manually, which is tedious and time consuming.Despite the use of imaging techniques in various sectors, its contribution in food processing sector is a remarkable one. Contamination of food is a major problem which causes various human health issues. In most cases, the contamination is not visible to the naked eye wherein these techniques play a vital role in detecting the contamination at initial stage. There are wide range of imaging techniques out of which hyperspectral imaging has a huge role. In this paper we have discussed the application of these techniques in analyzing quality and safety of various food and food products.

Keywords: Quality; safety; imaging techniques; contamination; hyperspectral imaging.

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Nano fertilizers for Sustainable Agriculture - A Review

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Abstract

Nanotechnology applications for use in agriculture has become increasingly popular by providing nanomaterials for sustainable agriculture. The use of mineral fertilizers and unsafe pesticides causes environmental problems and serious health issues. In this context, nanofertilizers and nanopesticides have emerged as novel technology and products, showing tremendous potential for growth in modern agriculture. Applications of different nano-fertilizers have greater role in enhancing crop production and also minimizes the pollution hazard.

Keywords: Nanotechnology, Nano fertilizers, Nano pesticides, Agriculture, Sustainable.

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Microcontrollers in Food Process Engineering

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Abstract

In this paper we are going to see about a uses of machine(microcontrollers) in various food processing industries. Starting from the initial these machines play a major role in vertical cropping. The cultivated in rural areas are mostly exploit to the cities and town due to the demand. In order to more production of crop the cultivation of those has to be increased. The crops are cultivated in a vertically stacked layer in order to save money and space for cultivation of other crops. Next mill of that product cultivated from the field is required. In this place they play major role by creating reduce the damage of the grains during extraction process. They also helps in improve the quality and quantity at low cost, low power by using automation techniques of VLSI based Microcontroller programming. If it is a fluid product like milk pasteurization of that is an important one to remove the contaminants. Usually for liquid food items like milk pasteurization has been done at high voltage 15kv and frequency between 250Hz-30khz After that mixing of ingredients, temperature humidity and CO gas regulation, drying of food products, color sorting, detecting the quality of air, water and fruit we given as input, and also the quality of food product we get at the end of the process. Then packing and storage of those products in an appropriate manner all those things are important for food industry.

Keywords: Food processing-vertical cropping-milling-pasteurization-regulation-temperature- humidity- CO- Color sorting - Nutrients quality - packing - storage.

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A Study on Sustaining the Medicinal Efficiency of the Styptic Plant

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Abstract

Sustaining the biological efficiency and medicinal values of the plants is one of the major problems that is faced by any biopharmaceutical industry and aswell as the food and technological industry. The process of biodegradation is one of the most important concepts that do play a role in degrading the components and thereby reducing the efficiency of the herbal products. The Indian medicine has lost the race in the medical sector due to the lack of techniques in preserving the complex chemical constituents. One of the most naturally occurring pain reducer with a faster clotting characteristics is Achillea millefolium of Asteraceae family, also is facing the similar situation. This herbaceous perennial is used for faster clotting during injuries due to its astringent action along with reducing the pain. Its ability to stop bleeding is due to the presence of Achilleine. This styptic plant's efficiency is always dependent on the shelf life of these plant powders that depends on the conditions of drying and storage. So a detailed study is initiated to draw maximum efficiency from nature given substance by proposing different drying process and aswell as storing conditions and also assess the efficacy of various techniques through characterization techniques like spectral and antimicrobial studies.

Keywords: *Achillea millefolium* , Antimicrobial activity, styptic plant, blood clotting

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Thermal Death Kinetics Analysis for Effective Sterilization of Microorganisms and Shelf Life Improvement of Milk

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Abstract

India is the worlds largest producer of milk and is a leading exporter of skimmed milk powder, which is a perishable food which needs preservation. The composition of cows milk is 87.7% water, 4.9% lactose, 3.4% fat, 3.3% protein and 0.7% minerals, milk is highly nutritious, high moisture content, possesses a neutral or slightly acidic and therefore allows the growth of a wide range of microorganisms. The purpose of the paper is to evaluate the growth rate and identify the activation energy efficacy mathematical model that describes microbial growth in milk. The microorganisms *Listeria monocytogenes*, *Yesinia enterocolitica*, *Shigella flexneri*, *Bacillus cereus* are the most common milk spoilage organisms, the analysis of Log C value on various time periods to sterilization temperature was studied. The results showed that the yield coefficient and Monod kinetics was linear and the individual growth rates were analysed for the effective determination of thermal death time. The activation energy required along with various sterilization temperature was analysed.

Keywords: Yield coefficient, Monod kinetics, Activation energy.

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The B-Chromatic Coloring for Silicate and Benzenoid Networks

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Abstract

In this research investigation the b-chromatic coloring for silicate and various benzenoid network are discussed. Different benzenoid derivates have been studied, namely benzene (G_1) and its derivative networks (G_2), naphthalene derived network (G_3), polyhex (G_4) and alkyl substituted benzene derivatives (G_5).

Keywords: b-chromatic, silicate network, benzenoid network

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Influence of Heat Treatment on the Properties of Mustard Oil

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Abstract

The objective of this present study to investigate the effect of different temperatures on the physical and chemical properties of mustard oil and the outcomes of the study were compared with non-treated mustard oil. Physical and chemical properties such as density, saponification value, acid value, free fatty acids, iodine value, p-anisidine value, peroxide value, unsaponifiable matter (UM) were analyzed and determined by IUPAC methods. Fourier transform infrared(FTIR) spectroscopy was used to identify the presence and changes in the functional groups of normal and heated oils. The consequences of this current study clearly indicated that, increase in temperature changed the physical and chemical properties of the oil due to the formation/presence of volatile compounds(aldehyde and ketone compounds)which was confirmed by IUPAC methods and FTIR analysis when compared with normal oil.

Keywords: Mustard oil, Volatile Compounds, Temperature

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Microwave Drying of Plant Materials

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Abstract

Drying is one of the conventional process to dry the plant sources in order to increase the shelf life and also available throughout the year without any quality degradation. There are so many drying methods and techniques available to dry the plant materials. Among the various drying methods, microwave drying method is one of the drying method which could be used in now a days. The microwave drying method is not only reduces the drying time by enhancing the drying rate but also maintain the quality of the dried plant materials. The microwave drying distributes the uniform thermal energy inside the cavity of the microwave and it reaches the inner surface of the plant materials in a shorter period of time and prevent the degradation of materials due to thermal effect.

Keywords: Drying, Microwave, Plant, Thermal

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Innovations in Biochemical and Food Technology

IBCFT - 2019

Editors:

Dr. Sivarajasekar N

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