SOUVENIR

International Conference

Emerging Technologies in Food Processing

ETFP -2021, 25 - 26th March 2021

Organized by

Department of Food Processing Technology

Ghani Khan Choudhury Institute of Engineering & Technology

Narayanpur, Malda, West Bengal – 732141

Website: https://www.gkciet.ac.in

International Conference

On

Emerging Technologies in Food Processing (ETFP-2021)

25-26 March, 2021

Organizing Secretary

Dr Kshirod Kumar Dash **Dr Mudasir Ahmad Malik**

Organized By

Department of Food Processing Technology

Ghani Khan Choudhury Institute of Engineering and Technology

Narayanpur Malda (West Bengal)

Email id: etfp21@gmail.com

www.gkciet.ac.in

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Showmik Bhowmik, Head, Computer Science

MESSAGE

I am delighted to know that the Department of Food Processing Technology is organizing an International Conference on "***Emerging Techniques in Food Processing (ETFP 2021)***" during March 25-26, 2021.

Food is among the basic requirements of the human being. Owing to the nature of food, it poses a lot of difficulties in reaching every corner of the world in its natural form. To make food available to every corner of the world, technological intervention in the sector of food processing is imperative. Food processing techniques that make the food available for a more extended period need more advancement, aiming to have minimal effect on the wholesome food and maximum storage life. The theme of the conference is appropriate and well thought, and I believe the recommendations from the conference will help in achieving the goals of the conference.

I am confident that this international conference will have deliberations on different technical perspectives of food processing techniques in different technical sessions. Therefore, it is expected that outcome from discussion among different scientists, academicians, and researchers will benefit the food industries and the people working in this field. The conference will highlight the issues related to food processing, address them with innovative ideas, and set the roadmap for future growth in food processing.

I congratulate the organizers for organizing this conference and wish them great success for the conference.

Prof. Parmeshwar Rao Alapati
Director
GKCIET Malda

MESSAGE

We welcome all delegates to the online International Conference on Emerging Techniques in Food Processing (ETFP-2021). It gives us immense pleasure that the conference will be attended virtually by different delegate worldwide belonging to various fields of food processing. This international conference will provide a platform for food scientists, young professionals, academicians, engineers, industrial participants, and budding students across the globe to share their research ideas. The conference will provide the scientific environment to conceive the new research ideas and will forge new collaborations. The conference will focus on the various emerging technologies in the food processing sector. Even under Covid-19 condition food sector was one among those sectors which were not completely closed down. Food being a perishable commodity, it is imperative to maintain the quality of food and during the pandemic time, extra care needs to be taken. The biggest challenge to the food technologist is to ensure the availability of safe, wholesome, and affordable food to the people. Food is the basic requirement for humans to survive, and it needs extra care to maintain the wholesomeness. In this conference, food scientist all around the globe will share their knowledge about various processes and technologies to have safe food for humans. This international conference has received around 170 abstracts and more than 230 delegates from all over the globe, who will share their research findings on different aspects of food processing. The conference will have several international speakers in the different technical sessions of the forum. The conference will have two specialized sessions for invited speakers, four technical sessions for oral presentation, and two sessions for the poster presentation.

We are very thankful to Prof. Parameswara Rao Alapati, Director GKCIET Malda, for continuous support and encouragement, which have greatly helped towards the successful organization of ETFP-2021. We are sincerely thankful to the members of the advisory committee for their valuable suggestions. We acknowledge the unwavering support received from the Head of the Departments, the faculty, and staff members of GKCIET. Our thanks also go to all the people who have given their precious time organizing this first international conference. We would also like to acknowledge our gratitude to Technical Team for providing the necessary technical arrangement for the smooth conduct of this conference.

Wishing all the delegates an informative and learning experience at the international conference and anticipating a successful event.

Organizing Secretary
ETFP-2021
Dr Kshirod Kumar Dash
Dr Mudasir Ahmad Malik

About The Institute

Ghani Khan Choudhury Institute of Engineering & Technology (GKCIET), Malda, West Bengal was established in 2010 by Ministry of Human Resource Development, Govt. of India and in the memory of Sri A.B.A. Ghani Khan Choudhury who had contributed immensely to societal development of the region. The Institute is located at Malda, West Bengal with the bordering districts of Bihar, Jharkhand and North Eastern states. Ghani Khan Choudhury Institute of Engineering & Technology (GKCIET), Malda was established with the objective to create a multi-layered inter disciplinary and inter-sectorial efficient professional technical manpower to act as an international podium for the development and transfer of technical competence in academics. It is committed to provide best possible technical education from grass-root level to higher level for economic upliftment and inclusive growth of society. The institute is at a distance of 7 km from Malda central railway station and 0.7 km from 34 No National Highway. It is surrounded by green land and mango trees with beautiful landscapes.

About the Department

Department of Food Processing Technology was established in 2010 supported by the Ministry of Education (formally know as Ministry of Human Resource Development (MHRD), Government of India. The Department of Food Processing Technology is one of the five constituent departments of the institute. The aim of the department is to generate human resources capable of accepting the current and future challenges of food processing sector of the country. The department is currently offering 3 years Diploma and 4 years B Tech. programs and contemplating the M Tech. and Ph. D program in future.

Vision: To create trained and skilled human resources well versed in technical aspects of food processing to cater the needs of research, industries and society.

Organizing Committees

1. **Patron**
   Prof. Parameswara Rao Alapati: Director, GKCIET
2. **Organizing Secretary**
   Dr. Kshirod Kumar Dash: Associate Professor and HoD, FPT
   Dr. Mudasir Ahmad Malik: Assistant Professor, FPT
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   Dr. Mudasir Ahmad Malik: Assistant Professor, FPT
   Dr. Anwesha Sarkar: Guest faculty, FPT
   Mr. Sumanta Kumar Guin: TA, FPT
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   Debashis Das: JE Civil
   Kajal Kumar Mandal: JE Electrical
9. **Student Volunteer Committee**
   Siddhartha Das: B. Tech 3rd Year
   Doli Hembram: B. Tech 2nd Year
   Souvik Roy: B. Tech 2nd Year
   Mustakima Saiyada: Diploma 3rd Year
   Sanchita Saha: Diploma 2nd Year

Program Schedule

25th March 2021

Inagural Program

Time: 10:00 AM-11:00 AM

Joining Link: https://global.gotomeeting.com/join/894894973

Welcome & Lighting of Lamp		
About the program	:	Dr. Kshirod Kumar Dash, Dean R&C, Organizing Secretary ETFP
Address by Patron	:	Prof. Parmeswar Rao Alapati, Director GKCIET
Address by Special Guests	:	Prof. Vijaya Raghavan, McGill University Canada
	:	Prof. Tridib Kumar Goswami, IIT Kharagpur, India
	:	Prof. Hosahalli S. Ramaswamy, McGill University Canada
Address by Guest of Honour	:	Prof. Sudhir K. Sastry, The Ohio State University, USA
Address by Chief Guest	:	Prof. R. M. Pant, Director NIRD& PR-NERC
Vote of Thanks	:	Dr. Mudasir Ahmad Malik, Organizing Secretary ETFP

Technical Session-I

Time: 11:30 AM-1:30 PM

Joining Link: https://global.gotomeeting.com/join/894894973

Invited Lectures

1. Prof Sudhir K. Sastry, The Ohio State University, USA
   Topic: Ohmic Heating: Concepts and Applications

2. Prof R M Pant, Director NIRD& PR-NERC

3. Dr Musfirah Zulkurnain, Universiti Sains Malaysia
   Topic: Ozone Solubility in Water and Effects on Pesticide Degradation in Fresh Produce

4. Prof Tridib Kumar Goswami, IIT Kharagpur, India
   Topic: Control Atmosphere Storage

Lunch Break (01:30 PM -03:00 PM)

Technical Session II

Time: 03:00 PM-5:30 PM

Joining Link: https://global.gotomeeting.com/join/894894973

Invited Lectures

1. Prof. Charanjiv Singh Saini, SLIET, Longowal, India
   Topic: Physical Modifications of Protein Isolate and its Functionality

2. Dr Sangeeta Mukhopadhyay, Quality Control Supervisor at Florida Crystals USA
   Topic: The Transition Graduate to Company Employee

3. Dr Satyanarayan Dev, Florida A&M University Florida, United States
   Topic: Artificial Intelligence in Food Safety

4. Prof Vijaya Raghavan, McGill University Canada
   Topic: Food Processing for Circular Economy Post Covid -19 Era

5. Prof Hosahalli S. Ramaswamy, McGill University Canada
   Topic: Pasturization / Sterilization Moving Along From Thermal to Non Thermal

26th March 2021

Technical Session-III
Track-I
Time: 9:00 AM-11:30 AM
Oral Presentations
Joining Link: https://meet.google.com/thx-bzyy-ckz

Chair: Prof. Prabhat Kumar Nema, National Institute of Food Technology Entrepreneurship and Management Sonepat, Haryana, India

Co-Chair: Dr Kshirod Kumar Dash, Ghani Khan Choudhury Institute of Engineering and Technology Malda

S No.	Authors and Affiliation	Title
1.	**Dr. Mini Sheth, Professor** The M.S.Universuty Of Baroda	Feasibility of Incorporating Fructooligosachharide in the Traditional Indian Non-Syrupy Sweets and to study their Organoleptic Qualities
2.	**Dr. Abida Jabeen, Associate Professor** Sher-E-Kashmir University Of Agricultural Sciences & Technology, Jammu & Kashmir	Evaluation of the Proximate composition and Pasting properties of selected local rice varieties grown in Jammu and Kashmir.
3.	**Dr. Quraazah Akeemu Amin Assistant Professor** Sher-E-Kashmir University Of Agricultural Sciences & Technology, Jammu & Kashmir	Generation of microbialamylases for industrial applications
4.	**Dr Khalid Bashir, Assistant Professor** Jamia Hamdard	Gamma Irradiation of Chickpea Flour
5.	**Khwaja Osama, Assistant Professor** Integral University, Lucknow	Dough rheology, textural, physicochemical properties and sensory evaluation of the underutilized Kadam *(Neolamarkia cadamba)*fruit powder enriched cookies.
6.	**Mayushi Malshika Jayakody** University Of Sri Jayewardenepura, Sri Lanka	Application of an alginate based edible coating to maintain the quality of minimally processed jack fruit (*artocarpus heterophyllus lam*) during cold storage
7.	**Mohd Ishfaq Bhat** G B Pant University Of Agriculture And Technology, Pantnagar, Uttarakhand	Reduction of Residual Lignin in Holocellulose obtained from Rice Straw Biomass

8.	**Pinku Chandra Nath** Nit Agartala, Tripura	Characterization of *Spirulina platensis* powder and its value addition to develop the food products
9.	**Sachin Kumar** National Institute Of Food Technology Entrepreneurship And Management	Microencapsulation of *Lactobacillus rhamnosus*ggby spray drying and its effect on Physicochemical properties and viability
10.	**Sourabh Kumar** National Institute Of Food Technology Entrepreneurship And Management	Kinetics of color changes in *khaja* during deep-fat frying
11.	**Abhishek Chandra** National Institute Of Food Technology Entrepreneurship And Management (Niftem)	Effect of ultrasound assisted osmotic pretreatment of papaya slices and cubes followed by vacuum drying
12.	**Ria Ahuja** The Maharaja Syajirao University Of Baroda	Evaluation of the Digitalized Targeted Public Distribution system in Urban Vadodara, Gujarat, India
13.	**Geethu M** Kerala Agricultural University	Effective packaging and storage techniques for green chilli.
14.	**Amardeep Kumar** Tezpur University	Bromelain inactivation of pineapple juice by ohmic heating and its effect on quality attributes
15.	**Rahul Mehra** Amity University Rajasthan, Jaipur, India	Brewing Technology; From Barely to Beer
16.	**Neha Gupta** Amia Hamdard University, Delhi And Shriram Institute For Industrial Research, Delhi	Validation of Method for Organo-Chlorine Pesticide Residues in Lanolin Using Gas Chromatography-Tandem Mass Spectrometry
17.	**Nongjaimayum Afzal Ali** IIT GUWAHATI	Mathematical modeling of microwave drying process for Centellaasiatica leaves and lemon: interplay of geometry & dielectric properties
18.	**Anwesa Sarkar** GKCIET Malda	Enhancement of Oil yield by Aqueous Enzymatic Extraction of Micro Algae
19.	**Kshirod Kumar Dash** Department of Food Processing Technology, GKCIET, Malda, WB	Evaluation of minimum fluidization velocity and terminal velocity of rice kernel

Technical Session-III

Track-II

Time: 09:15 AM-11:45 AM

Oral Presentations

Joining Link: https://meet.google.com/ser-oqqc-enm

Chair: Dr Jatindra Kumar Sahu, Indian Institute of Technology Delhi

Co-Chair: Dr Mudasir Ahmad Malik, Ghani Khan Choudhury Institute of Engineerin and Technology Malda

S No.	Authors and Affiliation	Title
1.	**Dr. M. Shafiur Rahman, Assistant Professor** Department of Food Engineering and Technology State University of Bangladesh	Supercritical fluid technology for the removal of cholesterol and nonpolar lipids for healthy food products
2.	**Mainao Alina Gayary** Central Institute Of Technology Kokrajhar	Preparation of Modified Rice Flour by Osmotic Pressure Treatment with Optimization through RSM Approach
3.	**Chingtham Chanbisana** College Of Horticulture, Central Agricultural University (Imphal), Thenzawl, Mizoram	Value addition of citrus waste from processing industries in NEH region
4.	**Dr. Narender Kumar** Gadvasu Ludhiana	Development of biodegradable films from heat and moisture treated corn starch
5.	**Dr Kuslum Jan**	Value addition to Food Industry by-products and wastes: Effect of plasticizer on the Properties of pellets and composites
6.	**Dr. Faria Fatima** Integral University	Overview on Efficiency and Future Scope of Nanotechnology in Processing, Preservation and Packaging of Food
7.	**Asfaq** Integral University	Active Packaging of Edible Coated Jaggery Cubes during Storage
8.	**Jyoti Singh** Lovely Professional University	Corn silk a potential source of valuable nutrients: a comparative account of varieties and silk stages
9.	**Dr. Swapnil Dnyaneshwar Deshmukh**	Influence of biosynthesized silver nano particle coating on quality parameters of Nagpur mandarin

	Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola	
10.	**Dr. Shilpa Dipak Deshmukh** Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola	Studies on Moisture Transfer during Microwave Puffing of Soy-Fortified Green Leafy Vegetables (GLVs) and Potato -Based Ready-To-Eat Snack
11.	**Mohd Aaqib Sheikh** Sant Longowal Institute Of Engineering And Technology, Longowal, Sangrur, Punjab	Valorization of plum (*Prunus domestica. L.*) Processing waste for value-added products: a comprehensive review
12.	**Uroosa Noor** University Of Allahabad	*Punica granatum* peel a promising source of antioxidant
13.	**Shashi Soni** University Of Allahabad	Exploitation of *Ananas comosus* peel as a potential source of prebiotic in food industry
14.	**Mythili S** Pondicherry University	Influence of Drying Methods on Morphological, Proximate Composition, Functional Properties of Cauliflower Leaves (Brassica oleracea var. botrytis)
15.	**Akhila P P** Pondicherry University	Effect of Chemical modification (Citric acid) on Physico-chemical, functional and morphological properties of Hausa potato (Plectranthusrotundifolius) starch: A non-conventional source of starch
16.	**Gh Jeelani Raja** University Of Kashmir	Impact of storage on the phytochemical characteristics of canned apricots
17.	**Maanas Sharma** Tezpur University	Characterization Of Encapsulated Phytocompounds From Black Jamun (*Syzygium Cumini*) Pulp Extracts Through Extruded Ion Gelation Technique
18.	**Pankaj Jha** Panjabrao Deshmukh Krishi Vidyapeeth Akola, Maharashtra	The effect of amylose-amylopectin ratios on functional properties of starch- based bionanocomposite films blend with chitosan for food packaging applications
19.	**Soumya Dash** CMS, NERIST, Nirjuli, Arunachal Pradesh 791109, India	Food Supply Chain models applications in fresh agro produce

Technical Session-III

Track-III
Time: 9:30 AM-12:00 Noon
Poster Presentations
Joining Link: https://global.gotomeeting.com/join/894894973

Chair: Prof. Sankar Chandra Deka, Department of Food Engineering &Technology, Tezpur University, Tezpur, Assam
Co-Chair: Dr Debrup Hui, Ghani Khan Choudhury Institute of Engineering and Technology, Malda, West Bengal
Dr Sudip Kumar Das, Ghani Khan Choudhury Institute of Engineering and Technology, Malda, West Bengal

S No.	Authors and Affiliation	Title
1.	**Jagriti Kashyap** Indira Gandhi Agriculture University Raipur Chhattisgarh	Utilization of maize (zea mays) by-product (corn cob) by extraction of cellulose
2.	**Qazi Showkat Ashraf** Islamic University Of Science & Technology Awantipora J&K India	Valorization of Lotus (Nelumbo nucifera Gaertn): A review on characterization, health benefits and applications in food Systems
3.	**A.Asha Monicka** Karunya Institute Of Technology And Sciences	Performance of Indirect Forced Convection Solar Dryer with Phase Change Material
4.	**Pooja Yadav** Pondicherry University	Encapsulation of amaranthus paniculatus(rajgeera) starch using spray drying
5.	**Pir Mohammad Junaid** Aligarh Muslim University	Disease preclusion through functional foods
6.	**Yograj Bist** Sant Longowal Institute Of Engineering And Technology	Effect of octenyl succinic anhydride on rheological properties of buckwheat starch
7.	**Rahul Das** Sant Longowal Institute Of Engineering And Technology	Vacuum frying of gulabjamun
8.	**Anjali P.N.** Pondicherry University	Comparative study on the physical, functional and structural characteristics of rice cultivars (oryza sativa l.)
9.	**Sabeena Manzoor** Jamia Hamdard, New Delhi	Application of edible coatings and active ingredients in shelf life extension of fruits
10.	**Vinay Kumar Pandey** Integral University	The effect of edible coatings incorporated with clove essential oil on the quality and shelf life of fresh fruits and vegetables
11.	**Ambreen Fatima Safvi** Integral University	Novel extraction techniques used in food processing
12.	**Alisha Ahmad**	Minimal processing of fruits and vegetables

	Integral University, Lucknow	
13.	**Bareera Siddiqui** Integral University Lucknow	Hurdle Technology in Food Processing
14.	**Akshat Bedmutha** Institute Of Chemical Technology, Mumbai	Development of immune boosting, easy to digest nutritious ready to eat or ready to prepare sip feeds for the elderly
15.	**M.K. Agni Vadivu** Kalasalingam Academy Of Research And Education	Drying characteristics of lemon grass in tray dryer
16.	**D.Karishma** KALASALINGAM Acadamey Of Research And Education, (Krishnankoi 626126)L	The rehydration behavior of oven-dried **Plectranthus amboinicus** leaves
17.	**Anam Aijaz** Sher E Kashmir University Of Agricultural Sciences And Technology,Kashmir	Biodegradable packaging: a contribution to the elimination of plastic waste in landfills.
18.	**Sushree Niharika Purohit1** Sambalpur University, Burla, Odisha	Texturizing Sweetened Yogurt with Modified Starch of Black Rice
19.	**Kamini Sharma** National Dairy Research Institute	Process optimization of eggnog using response surface methodology
20.	**Ku. Rutuja Narendra Deshmukh** Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra	Storage studies of blended marmalade
21.	**Pamela Denise V. De Ramos** Central Luzon State University/University Of The Philippines	Functional food applications of valorized pineapple waste
22.	**Aman Dixit** Hbtu Kanpur	Refractance window drying of vegetables: a review
23.	**Nandita** Harcourt Butler Technical University, Kanpur	Effect of Conventional and Advance Drying Methods on Plant Oil Powder and it's Application in Food Industry: A Review
24.	**Monika Singh** Center Of Food Technology, Uoa	Biodegradable And Edible Coating Polymer In Food Packaging Industry
25.	**Ramesh Rohan Shah** Mit College Of Food Technology, Pune	Development Of Standardization Recipe For Nutraceutical Chocolate Bar By Using Herbal Powder And Quinoa
26.	**Jaspreet Kaur** Guru Angad Dev Veterinary Animal Sciences University	Novel food packaging technologies in food preservation: future need of the modern world

27.	**Sabeera Muzzaffar** University Of Kashmir	Effect Of Candy Making And Storage On Physico-Chemical And Antioxidant Properties Of Muskmelon (Cucumis Melo) Fruit
28.	**Nafiya Qadir** University Of Kashmir, Srinagar	Physical Properties Of Fours Rice Cultivars Of Indian Temperate Region
29.	**Fozia R. Nath** Islamic University Of Science And Technology,Awantipora	Synthesis Of Nanoparticles From Plant Gum

Lunch Break: 12:00 -01:30 PM

Technical Session-IV

Track-I

Time: 01:30 PM-4:00 PM

Oral Presentations

Joining Link: https://meet.google.com/mng-sckm-hcj

Chair: Dr Sukumar Debnath, CSIR -Central Food Technological Research, Institute, Mysuru

Co-Chair: Dr Kshirod Kumar Dash, Ghani Khan Choudhury Institute of Engineering and Technology Malda

S No.	Authors	Title
1.	**Sukumar Debnath, Principal Scientist** Csir-Cftri, Mysore	Emerging frying technique for the production of healthy fried snack foods
2.	**Dr Aasima Rafiq, Assistant Professor** Sher-E-Kashmir University Of Agricultural Sciences & Technology	Revival of millets as a natural remedy for combating hidden hunger
3.	**Aparajita Priyadarshini, Assistant Professor** Sambalpur University	Adequacy of ohmic blanching on the quality characteristics of blanched mango (*Mangiferaindica*) cubes
4.	**Poonam Sharma, Assistant Professor** Integral University Lucknow	Ultrasound assisted valorization of *Citrus limetta* peel waste into pectin
5.	**Dr Soumya Ranjan Purohit, Assistant Professor**	Molecular Engineering to Modify Glycemic Index in Starchy Food Products

	Amity University Uttar Pradesh	
6.	**Jasleen Kaur, Assistant Professor** Lovely Professional University, Jalandhar	Radish greens: Waste to worth
7.	**Mazia Ahmed** University Of Allahabad	Optimization of culture conditions and media for the production of biocellulose through *acetobacter aceti*
8.	**Saadiya** Skuast-K	Spray – Freeze – Drying. an Alternative Approach for Drying of Foods and Allied Products
9.	**Priyanka** Lovely Professional University	Techno functional properties of chenopodium album l for further utilization
10.	**Radha Kushwaha** University Of Allahabad	A comprehensive approach on glass transition and their effec food product qualities
11.	**Prashansa** University Of Allahabad	Physiochemical and sensory characteristics of extruded product fortified with chickpea flour
12.	**Maeena Naman Shafiee** University Of Kashmir	Use of household processing for pesticide residue dissipation in fruits and vegetables
13.	**Dr. Sajad Ahmad Mir** University Of Kashmir, Hazratbal Srinagar, 190006	Effect of organic acids on various quality attributes of the traditional meat product during different storage conditions
14.	**Narinder Kaur** Lovely Professional University	Characterization and application of alkaline protease from a newly isolated strain of bacillus *paramycoides*
15.	**Reshma Saroj** University Of Allahabad	Effect of thermal and non-thermal treatments on nutritional and functional properties of wheat bran- an overview
16.	**Sumit Sudhir Pathak** National Institute Of Technology Rourkela	Food irradiation: history and future prospects
17.	**Unaiza Iqbal** University of Allahabad, India	Effect of storage on starch content of Amorphophallus paeoniifolius (Elephant Foot Yam)
18.	**Mudasir Ahmad** *University of Kashmir*,	Fabrication and characterization of nano encapsulated resveratrol, its bioactivity retention and release behaviour under gastro intestinal conditions

Technical Session-IV

Track-II

Time: 01:45 PM-04:15 PM

Oral Presentations

Joining Link: https://meet.google.com/qzm-dyue-bhk

Chair: Dr Abida Jabeen, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir

Co-Chair: Dr Mudasir Ahmad Malik, Ghani Khan Choudhury Institute of Engineering and Technology Malda

S No.	Authors	Title
1.	**Dr Prashant Saurabh Minz, Associate Professor** ICAR-National Dairy Research Institute	Machine vision based decision support system for quality evaluation of dairy products
2.	**Dr. Ritesh Balaso Watharkar, Assistant Professor** Karunya Institute Of Technology And Sciences	Encapsulation of probiotic with different carriers by spray drying
3.	**Dr. Tawheed Amin, Assistant Professor** Skuast-Kashmir	Novel and innovative green techniques for extraction valuable bioactive nutraceutical components from food waste
4.	**Dr Asima, Assistant Professor** University Of Kashmir	Exploring beta-glucan as nanocarriers for rutin as a model bioactive compound
5.	**Naveen Kumar, Assistant Professor** Amity University Rajasthan, Jaipur	Approaches for production of functional meat-based products
6.	**Dr. Bilal Ahmad Ashwar** University Of Kashmir, Hazratbal Srinagar	Effect of casein and whey protein interaction on the stability, antioxidant potential and bioaccessibility of sea buckthorn polyphenols during simulated *in vitro* digestion
7.	**Bipasa Misra** Government Of West Bengal	Repurpose used cooking oil (ruco): new health & eco friendly initiative
8.	**Mumtahin Ul Kousar** Skuast Kashmir	Hypolipidemic effect of modern used formulation with constituents & modern dosage responses
9.	**Bijendra Sahoo** Birla Institute Of Technology, Mesra	Effect of incorporation of crude rice bran oil extract on storage stability of coconut oil

10.	**Bisma Jan** Jamia Hamdard University New Delhi	Antidiabetic evaluation of different varieties of mulberry grown in kashmir and identification of their active metabolites by hptlc- ms bioautography
11.	**Anchal Singh** University Of Allahabad	Biosorption of chromium through *lactobacillus plantarum* and its exopolysaccharides
12.	**Gitanjali Gautam** Tezpur University	Verifying the optimum ultrasonic pulse mode for the encapsulation of gamma tocotrienol into high amylopectin rice starch
13.	**Sadaf** University Of Kashmir	Extraction optimization of green tea beverage using response surface methodology
14.	**Shaziya Manzoor** University Of Kashmir	Changes in fatty acid composition and oxidative stability of commonly consumed edible oils of north india during deep frying
15.	**Bhavana B K** CSIR-CFTRI, Mysore Keynote Speaker	Chemical-residue-free pretreatment process of wheat bran for xylose recovery
16.	**Mr. Uttam Kumar Ghosh** Maharaj Vinayak Global University, Jaipur	Library resources & services in engineering college libraries in digital era: analysing the cases of engineering college across west bengal
17.	**Haamiyah Sidiq** Sher-E-Kashmir University Of Agricultural Sciences And Technology Of Kashmir	Role of atomic force microscopy in food science
18.	**Dr. Romee Jan** University Of Kashmir	Incorporation of encapsulated bioactives from saffron and sea buckthorn into Indian traditional milk based products (Dahi and Paneer) as a source of polyphenols for the elderly people of the world
19.	**Dr Asir Gani** University Of Kashmir	Innovative green technology for encapsulation of vitamin D3 into β-glucan matrix using supercritical carbon dioxide
20.	**Jyotirmoy Goyary,** Department of Agricultural Engineering; Assam University, Silchar	Determination of a Suitable Thin-Layer Drying for Fruits and Vegetables: A Review

Technical Session-IV

Track-III

Time: 02:00 PM-04:20 PM

Poster Presentations

Joining Link: https://global.gotomeeting.com/join/894894973

Chair: Dr. V.R. Sinija, Indian Institute of Food Processing Technology, Thanjavur, Tamil Nadu.

Co-Chairs:

Dr Sudip Kumar Das, Ghani Khan Choudhury Institute of Engineering and Technology Malda, West Bengal

Mr Shib Shankar Choudhury, Ghani Khan Choudhury Institute of Engineering and Technology, Malda, West Bengal

S No.	Authors and Affiliation	Title
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2.	**Dr. Ritika B. Yadav** Maharshi Dayanand University, Rohtak (Haryana)	Development And Quality Evaluation Of Gluten-Free Noodles Prepared From Modified Pea Starches And Amaranth Flour
3.	**Shubham Rai** Harcourt Butler Technical University	Effect Of Spray Drying And Freeze Drying On Physiochemical Properties Of Wine Powder
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6.	**Abhishek Gaurav** National Institute Of Technology, Rourkela, Odisha	Varietal Comparison Of Color And Mechanical Properties Of Three Minor Millets
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31.	**Ankita Walia,** Amity University Rajasthan, Jaipur, India-303002	Assessment of Nutritional composition, acceptability, and shelf life stability of cookies fortified with pearl millet and oat flour
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36.	**Krishan Kumar,** Department of Food Technology, Dr. Khem Singh Gill Akal College of	Recent advances in non-thermal processing of food

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39.	**Mohd Shazeb Nazim,** Department of Post Harvest Engineering and Technology, Aligarh Muslim University, Aligarh, UP, India.	Vegetarian Proteins (TVP) by Extrusion Technology for Texturizing Making Plant-Based Meats: An Overview
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42.	**Nairah Noor,** Department of Food Science and Technology, University of Kashmir, Srinagar, India	Exploration of protein from Himalayan cheese as a wall material for improving the bioavailability of resveratrol
43.	**Touseef Ahmed Wani** Department of Food Science and Technology, University of Kashmir, Srinagar, India	Subcritical treatment of olive oil: Minor phenolic composition and antioxidant properties of the solvent extracts

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ORAL PRESENTATION

Feasibility of incorporating fructooligosachharide in the traditional Indian non-syrupy sweets and to study their organoleptic qualities

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Abstract

Sugar Consumption in India accounts for 65% which is the leading cause of rising morbidities and Non- Communicable Diseases (NCD'S). Studies have shown that sugar substitutes may play an essential role in the development of products with health promoting properties. Therefore efforts were made to substitute sugar with Fructooligosaccharide (FOS) and to study its feasibility in healthy sweets.

Methodology:Seven standardized and sugar substituted with FOS (20-70%) non-syrupy Indian sweets, namely, *DudhiHalwa, Shrikhand, MalaiPeda, Wheat Flour Sheera, Mohanthal, Rawasheera and Sukhdi*were determined for their organoleptic qualities using numerical score and difference test. Nutrient composition and fiber content of standard and sugar substituted FOS added sweets was assessed using Nutritive Value of Indian Foods (2017). Recovery of FOS in the sugar substituted FOS added sweets was studied using HPLC technique.

Results: F test revealed no statistically significant difference for various organoleptic attributes, added sweets at varying level from 20% to 70%. The sugar substituted FOS added *DudhiHalwa*and *Shrikhand*were the most acceptable sweets with the substitution up to 70%. *MalaiPeda*was most acceptable at 50 % level of substitution. *Mohanthal*and *RavaSheera*were most acceptable at 40% level of substitution. Whereas, in *Wheat Flour Sheera*and *Sukhadi*at 25%. HPLC analysis revealed recovery of FOS in the range of 86.30% (*Sukhadi)* to 142.06% (*DudhiHalwa) and Shrikhand*was only 15.65 %. The reduced recovery of FOS in *Shrikhand*was attributed to the degradation due to acidic pH of curd. Addition of FOS helped in reducing fat content by 70% without affecting sensory qualities. Increase in dietary fiber content was seen in Shrikhand and DudhiHalwa ranging from 13.8 g to 11.9 g.

Conclusion: FOS can be substituted in the range of 20-70% in most of the Indian traditional sweets without affecting the organoleptic properties.

Evaluation of the proximate composition and pasting properties of selected local rice varieties grown in Jammu and Kashmir.

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Abstract

Rice cultivation is an integral component of rich cultural heritage of the Jammu and Kashmir. The aim of this study was to evaluate the proximate composition and pasting properties of selected rice varieties. Ten different long grain and short grain varieties of rice were procured and evaluated for nutritional profiling and pasting properties. The maximum moisture content was found highest in Shalimar rice-1 (11.5%), and minimum moisture content was found in Shalimar rice -3 (7.4%).The total protein content was found highest in Shalimar rice-2 (7.50%) with lowest in Jehlum (6.14%) followed by K-332 (6.03%). The total fat percentage in this study was found highest in three rice varieties Shalimar rice-3, SKUA-420, SKUA-494 (1.02%) while as lowest fat content was found in Chenab and SR-1 (0.51%). The ash content was found maximum in red rice (0.53%) while the minimum ash content was found in Kamad (0.28%). The rice samples contained high quantities of carbohydrates ranging from 89.45 to 91.27%. The high percentage carbohydrate contents of the rice varieties show that rice is a good source of energy. The energy value of different rice varieties were ranging from 393.54 to 397.70 (Kcal/g). Results of starch revealed significantly ($p \leq 0.01$) low total starch content in SKUA-494 variety (70.15%), amylose in K-39 variety (15.70%), amylopectin in SKUA-420 (71.02%), and total sugar in SKUA-420 variety (0.18%).The results of pasting properties showed that pasting point or pasting temperature highest in SKUA-420 (89.30^{o}C) and lowest in SR-3 (78.0^{o}C), Peak viscosity highest in Jehlum(2711.50cP) and highest hold viscosity in Jehlum (2284.00cP).In present scenario there is need for not only high yielding varieties but also for nutritionally adequate rice varieties. Therefore, Shalimar rice varieties, Mushik-Budijh and Red rice varieties should get more attentions in terms of nutritional compositions and cooking qualities.

Generation of microbial amylases for industrial applications

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Abstract

The synthesis of starch involves a number of different enzymes. Sucrose is the first step in the production of starch. It is converted into the nucleotide sugar ADP-glucose, which is the real starch starter molecule. The amylopectin and amylose molecules are then synthesised by enzymes including soluble starch synthase and branching enzyme. Glycogen, a bacterial equivalent of amylopectin, is present in bacteria. The composition is identical to that of amylopectin. The most important difference is in the side chains: in glycogen, they are shorter and more numerous. For industrial production, microbial sources of amylases are favoured due to benefits such as cost effectiveness, reliability, widespread availability, higher stability, less time and space needed for production and ease of process modification. Besides that their increased production has facilitated the fulfilment of the industrial demands. Microbial enzymes comprise fungal and bacterial amylases. Nevertheless, it isconvenient to highlight a continuous demand to improve the thermal stability of all thedescribed enzymes. The current hunt for these enzymes is pushing enzyme manufacturers to create new industrial requirements by employing a variety of strategies. The first tactic will be to search for new microbial strains in extreme conditions like hydrothermal vents, salt and soda lakes, and brine pools e.g. the thermostable pullulanase from *Fervidobacteriumpennavoransor* α-amylase from *Pyrococcuswoesei.* The second technique is to use the conserved domains nucleotide or amino acid sequences to create PCR primers that can be used to scan genomes for the existence of genes putatively encoding the enzyme of interest.In the starch-processing industry, a significant number of microbial amylases are now commercially available, and they have nearly replaced chemical starch hydrolysis.

Gamma irradiation of chickpea flour

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Abstract

Today, radiation processing is emerging as one of the potential technologies for the food sector since it has been providing solutions not only for food security but also for food safety. Optimization of radiation dose is one of the important pre-requisites before radiating any food product. The present project pertains to studies on the use of gamma irradiation for the enhancement of shelf life of chickpea flour and its effect on any significant changes in the physico-chemical properties of the flour and the products prepared from the irradiated flour.Gamma irradiation was carried out at 0.5, 1.0, 2.5, 5.0 and 10 kGy. Studies were conducted for the various quality parameters at fixed time intervals of 0, 30, 60, 90, 120, 180, 240 and 300 days for the samples stored under ambient conditions. In the present study, the results showed that the insect infestation in unirradiated chickpea flour was found after five months of storage. Red flour beetle (*Tribolium castaneum*) and the drugstore beetle (*Stegobium paniceum*) were found in unirradiated chickpea flour. But in irradiated samples no insect growth was found in any of the samples treated with different doses of gamma irradiation. D_{10}-value for TPC and TYMC was found as 2.05 and 2.39 kGy respectively. Gamma irradiation had no significant effect on the proximate composition of the flour. Irradiation resulted in an increase in water and oil absorption capacity of the flour. The pH of the flour decreased with dose. Irradiation increased the peroxide value but the values were below 10 meq/kg oil for all samples. Gamma irradiation resulted in an increase in the reducing sugar content of the flours during storage. Pasting properties (peak viscosity, trough viscosity, final viscosity and pasting temperature) decreased as the irradiation dose increased. The decrease in the values of pasting parameters can be taken as advantage for ease of cooking and reduced retrogradation. The products prepared from the flours treated with 0.5 kGy to 1 kGy were liked the most by the panel of sensory evaluators.

Dough rheology, textural, physicochemical properties and sensory evaluation of the underutilized Kadam *(Neolamarkiacadamba)* fruit powder enriched cookies.

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Abstract

In this study the wheat flour was enriched with Kadam (*Neolamarkiacadamba*) fruit powder in 2.5%, 5%, 7.5% and 10% concentration along with the control having no kadam powder. The kadam powder has 50.86 g/100g of total dietary fiber (35.24g/100g insoluble and 15.62 g/100g soluble). It is also rich in minerals especially in calcium. The rheological properties of the cookie dough (50-gram butter, 50-gram sugar and 25 ml water in 100-gram wheat flour) were studied. The frequency sweep experiment revealed that the storage modulus of the cookie dough increased on increasing the concentration of kadam powder. The color analysis of the cookies showed a decrease in lightness in the cookie color on addition of kadam powder. The physicochemical investigation of the cookies showed an increase in the dietary fiber content and the calcium content of the kadam powder. The textural profile analysis of the kadam cookies showed the hardness of the cookies increases on increasing the concentration of kadam powder. The sensory evaluation of the cookies concluded that the cookies enriched with 5% kadam powder had the highest overall acceptability.

Keywords: *Kadam fruit; cookies; dietary fiber; underutilized fruit; Calcium*

Application of an alginate based edible coating to maintain the quality of minimally processed jack fruit (*Artocarpusheterophyllus Lam*) during cold storage

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Abstract

Jack fruit (*Artocarpusheterophyllus Lam*) is a fruit which is highly demanded by Asians. It is a large fruit and it is difficult to peel, therefore consumers prefer to buy it ready to eat. The aim of this study was to investigate the effect of application of an alginate based edible coating on quality parameters of pre-cut jack fruit with in a storage period of 5 days under refrigerated conditions. Total soluble solid content, Weight loss percentage, titrable acidity, pH and ascorbic acid content of coated and uncoated jack fruit pieces was measured for 5 days. According to the results, total soluble solid content and pH of both coated and uncoated samples has increased. On the fifth day, a higher total soluble solid content and a pH value was observed in the uncoated sample. Weight loss was observed in both coated and uncoated samples. During the storage period of 5 days, a higher weight loss percentage was observed in uncoated sample than the coated sample. Titratable acidity decreased during the storage period. Higher decrement in the titratable acidity was observed in uncoated sample. Ascorbic acid content was decreased during the storage period but there was no any significant different in the decrement of ascorbic acid content between coated and uncoated sample. Thus, within 5 days of storage lesser weight loss and higher quality values of Total soluble solids, titratable acidity and pH was obtained for jack fruit coated with 1% alginate.

Key words: *Jack fruit, alginate, edible coating, packaging, shelf life*

Reduction of residual lignin in holocellulose obtained from rice straw biomass

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Abstract

Rice straw biomass waste is one of the most promising alternative sustainable and abundant sources of raw material for synthesis of variety of products like biofuels, platform chemicals, fermentable sugars and value-added materials like nanocelluloses for application in diverse fields. However, the first step in the utilization of any lignocellulosic biomass is the breakdown of recalcitrant structure pertaining to the lignin-carbohydrate complex to achieve lignin free holocellulose. One such effort has been made in the present study to reduce the time required for lignin removal and also produce holocellulose with very less residual lignin percentage. A microwave assisted chemical treatment at different microwave powers (680, 800 W), irradiation times (4, 8 and 12 min) was applied at different bleaching solution (sodium chlorite) concentrations (0.4, 1.7 and 3.9 %) on dewaxed rice straw powder. The minimum amount of residual lignin was about 9.87 % (significantly less as compared to conventional single pass sodium chlorite treatment) for the experimental conditions of 800 W, 12 min and 3 %, while the maximum residual lignin of 75.8% was found for the experimental conditions of 640 W, 4 min and 0.4% respectively. Moreover, it was observed that the increase of microwave power on reducing the residual lignin at lower concentration was insignificant as compared at higher concentrations. The variation in time of irradiation also affected more at higher concentrations. The method was found suitable for quickly reducing the residual lignin in holocellulose recovered from rice straw and thus can be applied for other lignocellulosic biomass materials also.

Characterization of *Spirulina platensis* powder and its value addition to develop the food products

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Abstract

The intention of the current study was to estimate the nutritional compositions of Spirulina platensis powder and its incorporation in wheat flour for improvement of value added food products and their consumer acceptability. Spirulina powder consists of higher amount of protein (72.57%) with highest in vitro digestibility i.e., 92.59% and containing all essential amino acids specially total lysine (5.72 g/16g N) as this amino acid is lacking in wheat flour. It was found that good quantity of ash (3.50%), crude fibre (9.70%), β-carotene (137.65 mg/100g), vitamin C (51.24 mg/100g), γ-linolenic acid (14.80 % of total fatty acids), minerals and dietary fibre (Ca, P, Mg, Fe and Zn) i.e., 14.98%, whereas, carbohydrate (13.63%) and fat (1.27%) were found to be in very less amount which contributed low energy (353.55 Kcal/100g) content. Several food products such as biscuits, buns, bread, macroni and noodles have been prepared and assessed for their physico-chemical and sensory parameters by incorporation of Spirulina powder with wheat flour operating at various levels (2, 4, 6 and 8 percent). It was experimented that 6 percent Spirulina based supplemented food products were extremely suitable with high longevity. Therefore, it may be suggested for improvement of human health and also beneficial to prevent vitamin-A deficiency, malnutrition, anemia as well as other degenerative diseases.

Keywords: *Characterization, Spirulina platensis, wheat flour, value addition, sensory evaluation*

Microencapsulation of *Lactobacillus rhamnosus*GG by spray drying and its effect on physicochemical properties and viability

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Abstract

Lactobacillus rhamnosus GG (LGG) is an acceptable **probiotic strain**having an ability to survive and proliferate at gastric acid pH and in medium containing bile. Microencapsulation of LGGusing spray drying was attempted in this work to study the effect of microencapsulation on physicochemical propertiesand it's viability.LGGwasspray-dried with three levels of concentrations (10, 15 and 20% w/v) of maltodextrin. The inlet and outlet air temperature in the spray dryer was maintained as 170±5°C and 75±5°C respectively.Physicochemical properties(moisture, water activity and colour), and viability (CFU/gm and survivability of cells in simulated gastric and intestinal digestion)were examined. The results showed that 20 % (w/v) maltodextrin as encapsulating material produced the highest TSS (17.45). The final product hadacceptable moisture content (4.15 %) and water activity (0.35).The value of colour was l*, a* and b* were 96.05, -2.28 and 8.09 respectively.Thefinal probioticviability of spray dried powder wasapproximately10^9CFU/gm.This composition of the encapsulating material also showed satisfactory viability during simulated gastric and intestinal digestion. Based on the study, maltodextrin at 20 % (w/v) concentrations can be considered as the optimal encapsulating material having acceptable powder characteristics for the protection ofprobiotic microorganism from damage by the processing conditions of spray dry.

Kinetics of color changes in *khaja* during deep-fat frying

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Abstract

Khaja is a popular Indian traditional sweet prepared with layered dough structure through deep-fat frying and subsequent dipping in sugar syrup. The manufacturing steps include dough preparation, fat layering, rolling, sheeting, cutting, deep-fat frying. Kinetics of color changes in fried *khaja* was investigated with regard to different frying temperature (160-200 °C) and time (1-5 min). The surface color was determined in terms of CIELAB parameters L*, a*, b*, and ΔE*. The initial value of L* (before frying) was 82.80, which was gradually decreased to 59.04- 47.04, depending on the frying temperature. The ratio of yellow hue index and red hue index (b*/a*) was 30.47 initially, which was decreased in range of 5.48- 2.07, for different frying temperatures. The total color change (ΔE*) was increased from zero to 26.50-38.26 depending on the temperature of deep-frying. The L* followed a zero-order kinetics whereas the other color parameters followed a first-order kinetics. Color parameters are crucial for the quality check and consumer acceptance of the fried products. Kinetic modelling could be useful to predict the processing parameters for obtaining good quality of *khaja.*

Effect of ultrasound assisted osmotic pretreatment of papaya slices and cubes followed by vacuum drying

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Abstract

Papaya cubes and slices were dried by using vacuum drying technique and ultrasound assisted osmotic dehydration was employed as pretreatment method. Ultrasound assisted osmotic dehydration (USOD) were used on papaya slices in conjugation with vacuum drying (VD). Drying characteristics (moisture content, drying time and water activity) and color change were evaluated for the dried samples. It was observed that USOD-VD for papaya slices produced the lowest drying time and water activity with highest retention of bioactive compounds as compared to papaya cubes and conventional vacuum drying. FTIR analysis revealed that USOD pre-treatment followed by VD produced higher retention of bioactive compounds for papaya as compared to conventional vacuum drying.

Evaluation of the digitalized targeted public distribution system in urban Vadodara, Gujarat, India

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Abstract

Introduction: Targeted Public Distribution system (TPDS) and Ujjwala Yojana aim to supply LPG to Below Poverty Line (BPL) families, thus working in synergy towards better Food and Nutrition Security (FNS). Reforms by way of digitalization of the TPDS were introduced in 29 States as on March 2017, to ensure transparency and prevent leakages thereby promoting FNS. The Present study was conducted to study the functioning of Fair Price Shops (FPS) post digitalization and impact on Food and Nutrition security if any.

Methodology: A Cross-Sectional Study was carried out using stratified random sampling. Data were collect on adult members from 245 households on Socio-Demographic profile, Individual Dietary Diversity (IDD), Nutritional Status (Anthropometry), Food and Nutrition Security (FNS) and utilisation of TPDS. Functioning of 16 Fair Price Shops (FPS) catering to the study population was evaluated using a pretested questionnaire and observation method.

Results: Forty percent of the households reported that during the first visit of the month there was Unavailability of grains in TPDS, due to which frequent visits had to be undertaken by the subjects. Twenty five percent of households reported about nonfunctioning of TPDS during official working hours. In the random checks conducted by researcher it was found that nearly 44% of TPDS were not working during stipulated working hours either in the morning (9 am to 12 pm) and/or evening (3pm-7pm). It was observed that 87% of households were walking to TPDS outlet, as they were located within a distance of 0-5Kms thus accessibility was not an issue. The prices that were being charged for the commodities were not as per the government policy. The quality of the grains was adversely affected due to the absence of proper storage facilities for grains at 75% of the FPS and adulteration of grains with pebbles and chaff (reported by 88% of consumers). The poor quality of the grain was major deterrent to utilization of the grains by subjects. Observations indicated that 88% of the FPS indulged in underweighment of grains. LPG under Ujjwala Yojana was procured by 23 BPL card holders, while 75% of the BPL card holders were using either Kerosene or purchased the LPG from the grey market (INR 700). The FPS owners (100%) reported the absence of E-Gram facility and SMS alerts. Availability of fingerprint machines and maintenance of stock inventory using laptops were present in 43% of FPS, thus jeopardizing the functioning of digitalized system.

Conclusion: Strengthening of infrastructure in terms of improved storage facilities, supply of good quality grains from the central facility and provision of equipment for complete digitalization can improve the functioning and utilization of TPDS.

Effective packaging and storage techniques for green chilli.

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Abstract

Chilli, the hot spice of India is valued for the characteristic pungency, colour value and nutrient qualities. Chilli as a non climacteric fruit deteriorates rapidly results huge loss during postharvest handling and storage, which can be preserved byeffective packaging and storage techniques.The freshly harvested mature green fruits of *Capsicum frutescens* variety Vellayani Samrudhi and an accession Green Chuna were surface sanitised with 100ppm sodium hypochlorite for 15 minutes and packaged in micro-ventilated polyethylene cover (150 gauge), polystyrene tray over wrapped with cling film, polypropylene punnets and shrink wrapping with polyolefin film (25µ) in polystyrene tray and stored under ambient condition, refrigeration (4-7^{0}C) and cold storage (10-12^{0}C). Longest shelf life up to one month was observed in shrink wrapped fruits under cold storage in both varieties with highest organoleptic scores. Highest ascorbic acid content after one week of storage was observed in polythene cover and shrink wrapped fruits under refrigeration in Vellayani Samrudhi and Green Chuna respectively. In Vellayani Samrudhi, highest β-carotene content was recorded for fruits packaged in polystyrene tray over wrapped with cling film under refrigeration. In Green Chuna, it was in fruits packaged in polypropylene punnets under cold storage. In Vellayani Samrudhi, there was no significant difference in capsaicin content with respect to packaging and storage conditions. In Green Chuna, the capsaicin content was found to decrease after a peak in the initial period of storage. Varietal differences were observed in quality parameters of the fruits of *C. frutescens* during storage. Chilling injury was the major problem under refrigeration in both the accessions. Longer shelf life, higher total organoleptic scores and better nutritional qualities for shrink packaged fruits under cold storage recognised it as an effective technique for extending shelf life and retaining quality in green chillies.

Bromelain inactivation of pineapple juice by ohmic heating and its effect on quality attributes

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Abstract

Ohmic heating (OH) is one of the novel thermal technologies in which food samples are placed between the two electrodes and electric current is passed. Since the food samples act as resistance and depend on the electrical conductivity and electric field strength (EFS) applied, rapid, uniform and volumetric heating occur. A batch type OH set up was fabricated with an inner diameter of 25 mm and length 100 mm equipped with platinized titanium electrodes. Experimental studies were carried out with EFS (30, 35, 40 V/cm) and treatment time (60, 90, 120, 150, 180 s) for a set temperature of 90^{o}C. Time, temperature, voltage, and current data were recorded to study the pineapple juice's heating performance. Effect of OH treatment on the quality attributes and bromelain enzyme activity was also studied. The results showed that the time required to attain 90^{o}C under EFS 30, 35, 40 V/cm was 82, 56, 40 s, respectively, and it was concluded that the time required to reach the desired temperature decreases w.r.t. EFS. Electrical conductivity was found to be increased with an increase in the temperature of the sample and the relative activity of the bromelain enzyme was significantly reduced with an increase in EFS and treatment time. As for quality attributes, pH, total soluble solids (TSS), % titratable acidity (% TA), and color value were studied. It was observed that % TA of fresh juice and minimum value of OH treated juice was found to be 1.03± 0.05 and 0.94±0.04, respectively. Maximum colour change (ΔE) was found to be 16.88±3.76 when the juice was treated for 90 s at 40 V/cm. The above studies showed the applicability of ohmic heating as an alternative method for fruit juice processing and preservation.

Keywords: *Ohmic heating, electrical conductivity, bromelain activity, physico-chemical properties*

Brewing technology; from barely to beer

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Abstract

Beer is the most popular, widely consumed low alcoholic fermented drink consumed throughout the world. The barley malt, hops, adjuncts, yeast and water are the prime ingredients utilised in the preparation of beer. Barely is the excellent source of carbohydrates, phenolic compounds which imparts unique colour of the beer, and provide fermentable sugar which further utilised by yeast as the sugar source. Hops are the main ingredient of beer which is responsible for the bitterness of beer, unique flavour and aroma. These hops also act as a preservative agent. The moderate consumption of beer offers numerous health potentials including, anti-diabetes diuretic property (promotes urination), lower the risk of blood pressure, hydrates skin, and other heart-related disorders. Recently the trend of using adjuncts like rice, sorghum, corn and others in the preparation of beer is widely followed throughout the world. These adjuncts provide fermentable sugar, unique flavour and aroma. Some herbs are also added in a new variant of beer called craft beers which offers a wide range of therapeutic application. The process of making malt from barley is referred to as malting. This malting process involves the cleaning, sorting, grading, soaking of grains, germination, killing, drying and milling to obtain malt powder. Fermentation is a complex mixture of art in which the complex sugars are broken into the fermentable sugars, which further utilised by yeast to covert in alcohol and carbon dioxide. The manufacture of beer starts with the gelation of starch, mashing, wort boiling, wort clarification, the addition of yeast or alcoholic fermentation, filtration, pasteurization, carbonation, and storage for maturation.

Validation of method for organo-chlorine pesticide residues in lanolin using gas chromatography- tandem mass spectrometry

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Abstract

This study is based on optimized methodology for the determination of about twenty organo-chlorine pesticide residues in lanolin using hyphenated gas chromatography - tandem mass spectrometry (GC-MS/MS) technique with MRM (Multiple reaction monitoring) acquisition mode. Lanolin also called as wool grease, is analyzed for quantitative determination of organo-chlorine pesticides after treating with MSPD (Matrix solid phase dispersion) as sample cleanup technique. The proposed method is in support of safety and regulatory concerns arising because of pesticide residues in varied lanolin applications. Adequacy of the developed method was checked using guidelines of method validation procedures prescribed in SANTE/12682/2019 i.e. 'Method Validation and Quality Control Procedures for Pesticide Residues Analysis in Food and Feed' with respect to various validation characteristics, such as - selectivity, linearity, sensitivity, precision and accuracy. The validation results showed that the limit of detection (LOD) and limit of quantification (LOQ) for all the twenty organo-chlorine pesticide residues are 0.025 ng/g and 0.05 ng/g, respectively. The method was found to be linear over studied concentration with a coefficient of determination, $R^2 \geq 0.99$ for all the twenty pesticides. The method was found to be precise and accurate as indicated by acceptable precision with % Relative Standard Deviation, RSD $\leq$ 20 % and showed acceptable recoveries in the range of 90 to 118 % for the twenty organo-chlorine pesticide residues determined. The discussed multi-residue method for pesticide estimation employing GC-MS/MS technique, thus was found fit for the intended purpose.

Mathematical modeling of microwave drying process for *Centellaasiatica* leaves and lemon: interplay of geometry & dielectric properties

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Abstract

Microwave drying is a fast and effective drying technique for many agricultural products. However, usage of the drying technique for many plant products with a high bioactive component is still less popular due to lack of understanding of drying mechanism with microwave and its possible effect on its bioactive component. To develop a mathematical model of microwave drying *Centellaasiatica* and lemon slice were dried using different power settings of microwave viz.,400 W, 560 W and 800 W. For both the products, irrespective of microwave power, the drying time was less than 10 min which is a great advantage over conventional convection drying, which takes few hours time to dry equally. However, with an increase in power level, drying time became shorter and moisture removal increased for both the materials. As expected, the drying time and drying extent depend primarily on the geometry & dielectric properties of the target materials. In this study, measured moisture data w.r.t time was compared for each condition and kinetic models were developed by assuming a thin-layer drying process. The process parameters for microwave drying were microwave power and drying time. An effective model with higher values of coefficient of determination (R^2); and lower values of Standard Square Error (SSE) and Root mean square error (RMSE) were selected for further analysis. The effective moisture diffusivity (D_{eff}) was also determined and a mass transfer mechanism was proposed for drying with microwave in this communication.

Keywords: *Dielectric properties, Centellaasiatica, Lemon, Modeling, Effective moisture diffusivity, bioactives.*

Enhancement of oil yield by aqueous enzymatic extraction of micro algae

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Abstract

The research was conducted to study the effect of enzymatic treatment on wet algae biomass by cellulose and lipase to enhance the yield of oil. Increasing population and rapid industrialisation are unavoidable scenarios which is leading to unavailability of agricultural lands in present time. Therefore alternative ways to produce edible food source is gaining popularity day by day. Such an alternative is micro-algae, which are photosynthesizing unicellular organisms that can complete an entire growing cycle in few days. Micro algae can be cultivated in lands which are unsuitable for other agricultural crops by excavating open ponds. Microalgae are superior to terrestrial oleaginous crops for producing edible oils because the oil have high production rates, abundant polyunsaturated fatty acids (PUFA) and have high photosynthetic rates. The enzyme ratio (1:1), centrifugation time (10 min) and speed (5000 rpm) were kept fixed at specific level during the experiments. The independent variables of the experiment were enzyme concentration(0, 2, 4, 6 and 8 % v/v), incubation temperature (45, 50, 55, 60, and 65°C), incubation time (0, 6, 12, 18, and 24 h) and pH (3, 4, 5, 6 and 7). The dependent variable was maximum oil recovery. The data from all experiments were analysed by response surface methodology and the response function was developed using multiple regression analysis. The second order model was fitted with the different independent variables for modelling the response oil yield. The results indicated that the oil recovery was considerably increased with aqueous enzymatic extraction compared to other extraction methods. Optimum condition in aqueous enzymatic oil extraction of algae biomass was: enzyme concentration is 2.5 %, temperature of incubation is 60°C, incubation time is 7 h and pH 4. This paper provided an alternative process for edible oil production i.e. aqueous enzymatic oil extraction. This process of enzymatic extraction is an emerging technology that offers many advantages compared to the conventional extraction techniques. This process eliminates the solvent consumption, lowers the investment costs and energy requirements.

Preparation of modified rice flour by osmotic pressure treatment with optimization through RSM approach

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Abstract

Objective: The aim of present research work was to obtain the optimal process condition of osmotic pressure treatment (OPT) method for production of modified rice flour.

Methodology: Polished rice grains were washed with tap water and air dried for 1 h. Dried grains were ground with a mixer grinder and sieved through 150 µm sieve. Rice flour was dried in hot air oven at 40^{o}C until 10±2 % (wb) moisture content. A central composite rotatable design (CCRD) of response surface methodology (RSM) with three independent process variables was conducted to prepare the experimental design. The independent process variables were heating temperature (100-200^{o}C) and treatment time (15-60 minutes). For OPT, 100 g rice flour was mixed with 200 ml of saturated sodium sulphate solution and heated followed by repeated washing of rice flour with distilled water and centrifugation to remove the residual salt. Flour sediment was dried at 40^{o}C for 24 h, ground and sieved through 150 µm sieve. Rice flour was analyzed for final viscosity and setback viscosity in RVA. RVA gel was allowed to stand overnight and used to measure the gel hardness using texture analyzer.

Results and discussions: Statistical analysis revealed that both the process variables at different levels had significant effect ($p<0.05$) on the three responses viz. final viscosity, setback viscosity and gel hardness of rice flour. The optimal OPT process parameters to obtain rice flour with high final viscosity, high setback viscosity and high gel hardness were found at treatment temperature of 113^{o}C for 60 minutes heating time. The predicted values of the response variables were 6960.46 cP final viscosity, 3461.90 setback viscosity and 66.01g gel hardness.

Keyword:*Osmotic pressure treatment, central composite rotatable design, response surface methodology*

Value addition of citrus waste from processing industries in neh region

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Abstract

Production of citrus fruit is increasing day by day with the rise in demand in the northeast region. There are different processed products produced in various processing industries generating a huge waste product from such industries and the amount of waste is increasing year by year due to increase in production of citrus fruit crops with the development of advanced technologies. These waste matters are rich in various bioconstituents (soluble sugars, cellulose, hemicelluloses, pectin and essential oils) which will have huge economical value if it is tapped properly for production of pectin extraction, fermented products, candied peels, oil extraction etc. Inspite of being rich in such bioconstituents with good economical value, such parts are generally discarded from processing industries as waste in open field or dumping site. Citrus processing industries produce huge amount of citrus waste and citrus peel waste accounts for 50% of the total waste produced. Disposal of such waste means high economic loss. Utilisation of such waste for production of various value added products will help in uplifting the economic return of young entrepreneurs with generation of employment and bring socio economic development of the region as well as provide a solution for industrial waste management taking into consideration the health of ecosystem and ultimately the human health.

Keywords: *Candy, citrus, ecosystem, processing, value addition, waste*

Development of biodegradable films from heat and moisture treated corn starch

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Abstract

Modified corn starch is utilized in the development of biodegradable edible films. Films were prepared from corn starch alone and heat moisture treated (HMT) corn starch (CS). Biodegradable films were developed by the casting method. Edible films of good quality were developed from commercial CS and modified CS when used as a base material. CS (5.0%), glycerol (2.5%) and carboxymethyl cellulose (0.25%) were used to develop the films. During the preparation, the starch powder was poured into water and continuous mixing was applied. After complete mixing of starch granules addition of glycerol is done, followed by incorporation of Carboxymethyl Cellulose (CMC). HMT-CS based starch films presented better functional attributes than CS alone however CS presented good transparency values. Modified CS sample represented considerable gain in tensile strength. Films were also analyzed for solubility and water vapour permeation.

Keywords: *corn starch, HMT, biodegradable films, transparency, tensile strength*

Value addition to food industry by-products and wastes: effect of plasticizer on the properties of pellets and composites

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Abstract

Food industrial wastes due to their vast availability and disposalproblems can be used in packaging industries. However, the commercialization is still farbehind, therefore, development of pellets using food industrial wastes for the developmentof value-added biodegradable composites can be a better option.The present study aims to optimize the pellets formulation, effect of plasticizers and temperature on properties of pellets was also observed.The optimized pellets were characterized for their physico-chemical, functional, rheological and morphological properties. Processconditions and formulation for the development of these pellets are important for maintainingshelf stability and various properties during transportation and handling.Based on the observed densities, samples containingCNSL as plasticizer were denser than samples containing glycerol.Hausner ratio (HR) classified the extruded pellets as free flowing tomedium flowing. Properties ofthe pellets analyzed in this study could be helpful in further studies fordesign aspects related to the production, storage, packaging, handling, and overall acceptability of these pellets.

Overview on efficiency and future scope of nanotechnology in processing, preservation and packaging of food

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Abstract

Nanotechnology has revolutionized a host of research and technological fields, including the food industry. Food production, packaging, practical food growth, food protection, and identification of foodborne diseases are just some of the applications of nanotechnology that have arisen as a result of the growing need for nanoparticles in relevant disciplines of food industry. Nanomaterials have sparked a lot of excitement in recent years because of their extraordinary properties, which make them ideal for packaging materials because they improve mechanical, kinetic, and gas barrier properties of packaging materials while being non-toxic and environmentally friendly. Montmorillonite (MMT), zinc oxide (ZnO-NPs) coated silicate, kaolinite, silver NPs (Ag-NPs), and titanium dioxide (TiO_2NPs) are perhaps the most common nanoparticles used in packaged foods. These nanostructures coated films act as a deterrent towards oxygen, carbon dioxide, and other volatile organic compounds.Components of nanotechnology's use in regards to enhance the food nutrition and organoleptic properties have also been briefly addressed, as well as some observations into safety risks and regulatory questions about nano-processed food products. The most challenging part of preparing these nanocomposites is ensuring that they are spread uniformly in the polymer matrix and that they are compatible.The most challenging part of preparing these nanocomposites is ensuring their full delivery and stability within the polymer matrix. As a result, there is a growing need for improved nano-packaging material efficiency, such as mechanical stability, degradability and antibacterial effectiveness. The use and effects of nanotechnology on food nutritional and sensory properties is briefly explored, along with some observations into safety legislation on nano-based functional ingredients and preservation.

Keywords: *nanotechnology, Montmorillonite, titanium dioxide, nanocomposites*

Active packaging of edible coated jaggery cubes during storage

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Abstract

Jaggery is one of the primogenital and sweet-smelling sweetener in India which is prepared by the concentration of sugarcane juice through boiling process. The main problem associated to jaggery is running-off (liquefaction) and deterioration of color during storage. Its storage is highly influenced due to presence of invert sugars and mineral salt which are hygroscopic in nature. To extend the shelf life of this commodity there is a need of new technologies. Edible coating and active packaging appears one of the good alternatives for this. Edible coating is used as a barrier to minimize water loss while active packaging maintains dry conditions within packages. The independent variables decided for active packaging of jaggery cubes were, moisture absorber (2.64, 4,6,8 and 9.36g), concentration of CMC and HPMC (0.528, 0.8, 1.2, 1.6 and 1.872g/ml) and thickness of high density polyethylene bags (66, 100, 150,200 and 234μm) were taken for research work. The storage study of active packaged edible coated jaggery cubes was conducted for 180 days. The responses via pH, water activity, and reducing sugar were analyzed at different interval. The statistical analysis of each sample was done to check the significance of data. The water activity and reducing sugar decreased with increase moisture absorber, concentration of CMC and HPMC and thickness of HDPE bags. The pH of stored active packaged edible coated jaggery varied from 5.47 to 5.74 and water activity was in range of 0.531 to 0.699 and reducing sugar varied from 1.33 to 2.98 μg/ml. For best shelf life of jaggery the optimum values of independent variables obtained by compromise optimization of the responses were; 8g moisture absorber, 1.178 g/ml concentration CMC and HPMC and 197μm thickness of HDPE bags for 180days storage.

Corn silk a potential source of valuable nutrients: a comparative account of varieties and silk stages

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Abstract

Corn silk is an agriculture waste that has been neglected so far. The primary use of corn silk stayed as animal feed for so long, with exception of some indigenous food preparations in specific regions and few medicinal formulations. The current work is aimed to distinguish corn silk as potent functional ingredient that could be used for various commercial food preparations. This current study evaluated the potential antioxidants of selected varieties of corn silk from Punjab, India that are popularly cultivated. The work held also helps in evaluating the suitable stage of corn silk according to its antioxidant potential. Five major varieties namely, SWARNA, TATA7009, SHUBHAM EARLY, KESHAR KING and G5417 at five growth stages that includes stage 1(immaturity), stage 2, stage 3, stage 4 and stage 5 (maturity) were analysed for their phytochemical potential. The total phenols, flavonoids and ascorbic acid content along with the antioxidant activity potential using free radical scavenging activity (FRSA), ABTS and Ferric ion reducing antioxidant power (FRAP) were tested in these samples. Highest values of antioxidant activity with FRSA, ABTS and FRAP, corresponding to 65.33±1.21%, 84.16±0.55% and 123.2±0.56%, respectively were observed in G5417 stage 1, out of all the other varieties and stages. Also G5417, showed the best results for ascorbic acid content, while, SHUMBHAM EARLY stage 2 showed better results for total phenols content. Whereas, KESHAR KING stage 1 has showed the highest value for flavonoid content (239.47±2.33 mg QE/100g) followed by G5417 stage 1 (237.10±0.86 mg QE/100g) and SAWRNA stage 1 (217.89±1.63 mg QE/100g). Statistical analysis showed that the juvenile stage of G5417 (stage 1) has better overall performance amongst all the selected varieties and stages. Conclusively, G5417 (stage 1) that is commonly used for baby corn production and is obtained as an agro-industrial by-product could have huge commercial value for preparation of functional foods and nutraceuticals.

Keywords: *Corn silk, phytochemical, antioxidant, nutraceutical, Agro-industrial waste*

Influence of biosynthesized silver nano particle coating on quality parameters of Nagpur mandarin

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Abstract

The present experiment was carried out in the Post Harvest Technology laboratory, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during mrig bahar 2017-18. The silver nano particles synthesized biologically from silver nitrate solution using different leaf extracts such as neem, tulsi, guava and annona. The objective behind this study was to investigate the effect of biosynthesized silver nano particle coating in prolonging the shelf life of Nagpur mandarin. The experiment conducted with eleven treatments and four replications under RBD experimental design. Results suggested that surface coatings of biosynthesized silver nano particles have potential to enhance shelf-life of Nagpur mandarin as its fruits could be successfully stored for 60 days under cold storage conditions with highly acceptable sensory quality. Surface coatings influenced all the studied attributes significantly but the fruits coated with GSNp tulsi was the most effective in maintaining lowest physiological loss in weight (4.17%), fruit decay rate (3.50%), chilling injury (3.57%), microbial count (0.50 CFU/ml) and could retain quality attributes *viz.*, souble solids content (14.19 ^{o}Brix), total sugar (9.29%), reducing sugar (5.32%), ascorbic acid content (35.82 mg/100 ml) and total sensory score (8.50) of the fruits without any adverse effect.

Key words – *Nagpur mandarin, Shelf life, Green Silver Nano Particles (GSNp), Leaf extract, Quality*

Studies on moisture transfer during microwave puffing of soy-fortified green leafy vegetables (GLVs) and potato -based ready-to-eat snack

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Abstract

Drying is one of the important processes within the food industry, also together of the foremost frequently studied topics in food process engineering. Optimizing drying process will result in lower production costs and increased product quality. Moisture transfer in heterogeneous materials, like foods, may be a complex process where quite one mechanism may occur. The mechanism governing moisture transfer during drying i.e. microwave puffing is complex and is highly dependent on the food's structure, particularly its porosity, which can change as drying proceeds. In this study, microwave puffing characteristics of soy-fortified GLVs and potato based flat cold extrudate, after requisite convective drying, was investigated experimentally in microwave oven. Effect of different microwave power on total puffing time was determined. Experiment were conducted at five different microwave power i.e. 180 W, 360 W, 540 W, 720 W, 900 W (calibrated power as 140 to 700 W) and its influence on moisture content was studied. The cold extrudate in flat strip form with constant initial moisture content of 0.55 kg/kg of dry matter during convective drying and was used for experimentation with sample size of 30 g for each set of experiment. Higher microwave power corresponds to higher drying rates and faster drying time. Drying rate is defined as function of temperature and time. The falling also as constant rate period was observed for the drying rate of RTE snack.

Keywords: *Extrudate, Microwave, Puffing, Snacks, Moisture transfer*

Valorization of plum (*Prunus domestica. L.*) processing waste for value-added products: a comprehensive review

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Abstract

In recent times, utilization of agro-food waste has emerged as a viable substitute to produce value-added products and has gained more attention due to their convenient characteristics in the food, cosmetics and pharmaceutical industries. Plum is a seasonal fruit belonging to the genus *Prunus.* Plum stones arise as a waste material during processing of plum into processed products. Plum stones contain a seed with a significant amount of lipids (45.95 – 50.00 %) and protein (35.9 - 41.3 %) that are mostly underused and undervalued. Plum kernels have been considered as a cheap source of active carbons, carbonaceous adsorbents, bioactive peptides, fibers, minerals and a potential biodiesel feedstock. Plum kernel oil has satisfactory antioxidant potential due to the presence of bioactive compounds. Plum kernels contain a naturally aromatic cyanogenic glucoside (amygdalin) compound responsible for the bitterness. The health promoting benefits of amygdalin have been well documented over the years. Despite its high nutritive value, plum kernels have not been effectively exploited due to the presence of substantial amounts of cyanogenic glycosides such as amygdalin (range 0.1 - 17.5 mg g^{-1}), a naturally aromatic cyanogenic diglucoside compound responsible for the bitterness. Improper disposal of plum pits generates environmental pollution problems and a significant loss of biomass that might be used to obtain value-added products as well as the renewable energy source to replace fossil fuel. To achieve the most economical and efficient utilization of such waste products for protein and oil production, more information on the compositional characteristics, anti-nutritional factors and antioxidant potential of plum kernels is required.

Keywords: *Plum kernels; oil; protein; amygdalin; antioxidant potential*

Punica granatum peel a promising source of antioxidant

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Abstract

Punica granatum (pomegranate) is mostly cultivated in South Asian and Mediterranean countries in which India ranks first in respect to production and cultivation area. Huge amount of pomegranate waste mostly peel are generated from the processing industries and became a serious environmental problem. Not only fruit but its non-edible parts such as peel, seeds, flowers, bark, buds and leaves also contains higher amount of nutritionally and biologically active compounds than of fruit and used as medicinal therapy since centuries. More than 150 phenolic compounds have been reported in peel such as phenolic acid, punicalagin, ellagic acid, hydrolysable tannins, anthocyanin, flavonoids etc. which consequently, increases their antioxidative power. It can be combined in many food products as a functional ingredient to increase their medicinal value by enhancing antioxidant content hence, provide protection against chronic diseases like cancer, hypertension, type 2 diabetes, liver, renal and cardiovascular disorders etc. This study elucidates the therapeutic potential of *P. granatum* peel by promoting positive health benefits.

Key words: *Punica granatum, cultivation, nutritionally, biologically, phenolic compounds*

Exploitation of *Ananas comosus* peel as a potential source of prebiotic in food industry

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Abstract

Ananas comosus is a multipurpose tropical fruit, which exhibits high medicinal value with marvelous taste. Hence, it is widely utilized in the food industry which produces million tons of by-products annually. Instead of disposing those off these by-products can be better exploited as potential neutraceutical agent due to its mesmerizing nutritional and anti-nutritional value. Peel of *A. comosus* has been proved as prominent source of dietary fiber which ultimately increases its prebiotic potential. The term prebiotic refers to the non-digestible food components that are fruitful for the growth of good microbes present in the colon of host. Consequently, it relieves from the symptoms of diarrhea and constipation as well as it also reduces the risk of atherosclerosis, osteoporosis, obesity and insulin resistance. It is utilized majorly in food industry as fiber supplement and as preservative for increasing shelf-life of food products. The main of this study is to explore the therapeutic potential of *A. comosus* peel.

Key words: *Ananas comosus, Medicinal value, Prebiotic potential, Neutraceutical, Dietary fiber.*

Influence of drying methods on morphological, proximate composition, functional properties of cauliflower leaves (*brassica oleracea var. botrytis*)

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Abstract

Cauliflower (*Brassica oleracea var. botrytis*) is one of the most consumed vegetables throughout the world. It has a higher waste index during post-harvesting, thus creating a foul-smelling on decomposition. Disposal portion of cauliflower, which contributes to about 45–60% of the total weight of the vegetable. The stems, pods, and outer leaves are important by-products during cauliflower harvest. *Brassica oleracea var. botrytis* outer leaves have been underutilized and discarded by many consumers as food for animals or household waste. Cauliflower outer leaves are also a rich source of dietary fiber,minerals, vitamins,and antioxidants, which helps in preventing manydiseases. The study aimed to determine the effect of drying methods on the proximate composition, Physico-chemical properties, morphological characteristics of cauliflower leaves. In the study, it was observed freezedried sample has less moisture content (10.58%) compared to the tray dried sample (12.43%). freezedried sample (28.45%) had the highest protein and ash content, while the tray dried sample (27.23%) exhibited the lowest. Enhancement of color was observed freeze dried sample followed by tray dried sample. Tray dried sample shown lower water activity (0.35) compared to freeze dried sample(0.54). The highest water absorption capacity and solubility were observed in tray dried sample followed by freeze dried. Morphologically, traydried leaf powder has a compact and irregularly shaped structure, while freeze dried sample has the least structural changes was observed. However, there was a slight significant difference observed in bulk and tapped density.

Keywords: *Cauliflower leaves, tray drying, freeze drying.*

Effect of Chemical modification (citric acid) on physico-chemical, functional and morphological properties of Hausa potato (*Plectranthusrotundifolius*) starch: a non-conventional source of starch

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Abstract

A study was conducted to investigate the effect of citric acid modification on physico-chemical, functional, and morphological properties of starch isolated from Hausa potato **(*Plectranthusrotundifolius*)** starch. Hausa potato is a non-conventional source of starch, having a yield comparable with other conventionally available starch. Hausa potato starch was chemically modified using citric acid (10%, 20%, 30%, and 40%) as an esterifying agent. The degree of substitution, morphology, physico-chemical, and functional properties were studied. The degree of substitution increased with an increase in the citric acid concentration. A higher degree of substitution (0.14%) was observed in 40% citric acid-treated starch. The Fourier transform infrared spectra of citric acid-modified starches exhibited a new absorption peak at 1728cm^{-1}, which representedthe addition of some ester group to starch chain. The swelling index of native and citric acid-treated starches increased with an increase in temperature, whereas citric acid treatment resulted in a reduction of swelling of granules. The solubility of starch increased with an increase in temperature and degree of substitution. Light transmittance and syneresis decreased with an increase in the degree of substitution and storage period. Citric acidmodification of Hausa potato starch showed improved characteristics, which have a remarkable impact on food application as a functional ingredient.

Impact of storage on the phytochemical characteristics of canned apricots

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Abstract

Apricots (*Prunus armeniaca L.*) have a high concentration of bioactive compounds which are beneficial to human metabolism. Since apricots have a short shelf life due to their active metabolism, high perishability, and rapid ripening behaviour, canning can be an ideal way to conserve them. The antioxidant activity of apricots as wholes, halves, and pulp was quantified using ABTS, BCBA, DPPH, metal chelation, reducing power, and HPLC in this study. Physicochemical properties such as mineral content, titrable acidity, complete and reducing sugars, β-carotene content, and others were also investigated during the 6 month storage time. Pulp has been found to exhibit higher concentrations of these compounds within apricot wholes, halves and pulp. Our findings show that storage narrowed the phytochemical content and antioxidant ability of canned apricots, owing to substantial diffusion of their phenolic compounds into the surrounding syrup, but apricots still retained a significant amount of polyphenols and carotenoid compounds after six months of storage. However, physicochemical characteristics of canned apricots have increased substantially during storage.

Key words: *Apricots, antioxidants, canning, carotenoids, perishability.*

Effect of thermal and non-thermal treatments on nutritional and functional properties of wheat bran- an overview

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Abstract

Wheat bran is an important by-product in the cereal industry. Wheat bran is deliberated as one of the most ample and economically cheap sources of insoluble fiber, mineral and various bioactive compounds. Thermal and Non-thermal treatment applied to wheat bran to inactivate the endogenous enzymes that responsible for rancidity. These treatments help to enhance the nutritional and functional properties of wheat bran. While applying thermal and non-thermal treatments it increased the nutritional value and decreased in anti-nutritional compound thus, it improved the bioavailability of wheat bran. In future treated wheat bran can be applied for in making functional foods which can helps in preventing various chronic diseases like colon cancer, constipation, diabetics etc. This review will summarizes about thermal and non-thermal treatment and their application applied in making various functional food products.

Key words: *Wheat bran, Thermal treatment, Non-Thermal treatment, Bio-availability, Chronic diseases*

Characterization of encapsulated phytocompounds from black jamun (*Syzygium cumini*) pulp extracts through extruded ion gelation technique

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Abstract

Black Jamun (Syzygium cumini) is an underutilized fruit growing widely in different agro-climatic conditions. The Black Jamun fruit isrich source of anthocyanins. Phytocompounds, mostly anthocyanin in jamun fruit pulp had shown the potential for antioxidant activity and many health-improving effects. Encapsulation shows the various potential application to improve efficiency of phytocomponents and antioxidants as an active functional material. Therefore, the phytocompounds from jamun pulp were extracted and encapsulated to deliver as a functional ingredient. The study aimed to encapsulate the phytocompounds extract from black jamun fruit pulp and characterization of encapsulates. The hydrogel beads of jamun extract were prepared by external ionic gelation through a calcium alginate system. The jamun extract (85%) with alginate and alginate-pectin (15%) were encapsulated using Buchi B-390 Encapsulator, nozzle diameter of 300 µm, vibration frequency of 100 Hz, electrode tension of 400 V, air pressure of 200 mbar and feed rate of 11.5 ml/min. The prepared hydrogel beads were analysed for total phenolic content, total anthocyanin content, antioxidant activity, and encapsulation efficiency. The morphological study of encapsulated jamun beads were performed by scanning electron microscope (SEM). Addition of alginate-pectin improved the encapsulation efficiency of jamun beads. The beads coated with alginate-pectin shown the higher total phenolic, anthocyanin content, and antioxidant activity. SEM analysis shown the irregular, spherical shapes having internal cracks, shrinkage and voids due to freeze drying process. The results highlighted the potential of using combinations of natural polymers with the aim of formulating the optimal encapsulation matrix of jamun pulp extract. The hydrogels reinforced with alginate-pectin beads improved the classic calcium alginate system leading to a promising strategy to protect and deliver jamun pulp extract into food products.

Keywords: *phenolic content, anthocyanin content, antioxidant activity, encapsulation efficiency, scanning electron microscope*

The effect of amylose-amylopectin ratios on functional properties of starch- based bionanocomposite films blend with chitosan for food packaging applications

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Abstract

The present study is focused on the influence of amylose and amylopectin ratio on crystallinity, water barrier, mechanical, morphological and anti-fungal properties of starch-based bionanocomposite films. The different sources of starch containing various proportion of amylose and amylopectin (high amylose corn starch, 70:30; corn starch, 28:72; wheat starch, 25:75; and potato starch, 20:80) has been incorporated with chitosan (CH) and nanoclay (Na-MMT). Amylose and amylopectin ratio has regulated the orientation of molecular structure in the starch-based films. Experimental results have revealed that the prepared bionanocomposite films that of CS/CH/nanoclay has exhibited higher crystallinity and molecular miscibility among corn starch, with chitosan and nanoclay were confirmed by XRD. CS/CH/nanoclay has exhibited lowest water vapor permeability and highest tensile strength due to molecular space present in corn starch. Fourier transform infrared spectroscopy has confirmed the shift of amine peak to a higher wavenumber indicating a stronger hydrogen bond between starch and chitosan. Finally, the best bionanocomposite films were tested for food packaging applications. Low-density polyethylene has exhibited fungal growth on 5^{th} day when packed with bread slices at 25 °C and 59% RH whereas CS/CH/nanoclay bionanocomposite film did not show the same for at least 20 days. CS/CH/nanoclay film could potentially be useful for active packaging in extending shelf life; maintaining its quality and safety of food products thus substituting synthetic plastic packaging materials.

Emerging frying technique for the production of healthy fried snack foods

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Abstract

The Indian snack food market is expected to grow annually by 6.42% (CAGR 2021-2025) and will be more than INR 1 Billion by the end of 2024.Revenue in the snack food segment amounts to US$43,547 m in 2021. The fried snack foods are very popular in India. These foods have been developed over thousands of years and are still in high demand by the modern people. Deep fat frying involves simultaneous heat and mass transfer and a common step for the preparation savoury snacks contains 20-40% oil. However, there is a growing awareness among consumers with regard to deep fat fried snack food with low fat in order to reduce the chances of cardio vascular diseases and obesity. The main challenge is, therefore, to improve the frying process by controlling and lowering the final fat content, retention of the bioactive components of the fried products, to prevent oil deterioration due to oxygen, heat, and water. So to reduce oil content in the product and to prevent formation of these hazardous compounds one have to switch over towards the alternative approaches to deep frying to get stable product with longer shelf-life. One among the emerging techniques to attain these objectives is *Vacuum frying* which is carried out under pressures well below atmospheric levels (10-100 mPa) and low temperature (95-120 °C).This could be a feasible alternative to produce fruits and vegetables snack foods with reduced oil (50-60%) content, natural color, desired texture and flavour characteristics, lesser volume shrinkage of the fried product, lesser degradation on oil quality, retention of bioactive components and significant reduction (97%) in acryl amide in potato chips. The CSIR-CFTRI, Mysore has developed and patented prototype vacuum frying system (10 kg/batch) in this regard. This invention will be useful for development of healthy fried snack food products with low fat, high retention of colour and bioactive components during large scale production for mass feeding. However, the presentation will highlight on this emerging approach of food processing for development of healthy fried snack foods, their marketability, economics etc. for inspiring the students to take food technology as their future career.

Keywords: *vacuum frying system, low fat content, oil degradation, retention of bio-actives*

Revival of millets as a natural remedy for combating hidden hunger

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Abstract

With the prevalence of food insecurity globally, there is a growing need to effectively utilize the available crops to develop nutritious, affordable, and palatable food for the population. Consumption of millets-based products in daily life could help to maintain a healthy lifestyle as millets are a rich source of all nutrients and phytochemicals which combat chronic diseases. Millets have long been eaten as part of India's daily diet. Millets had been a major staple food in central India, southern India, and Uttarakhand's hilly regions for centuries before the Green Revolution. Millets were phased out of our diet after the introduction of high-yielding rice and wheat varieties in the 1970s. Millet is a major source of nutrition, protein, vitamins, and minerals for millions of people in deprived areas where it is produced. Millet, like sorghum, contains 9 to 13% protein, when compared to maize, millet is 8-60% higher in crude protein, and 40% richer in amino-acids lysine and methonine. The need for the hour is to increase the awareness programs to focus on millet consumption as a staple food to improve nutritional security in the future and convince the nutritional benefits and enhance the nutritional bioavailability, organoleptic properties, reduces the antinutritional factors. Moreover there is a dire need of extension activities to popularize the cultivation and explore the market potential for value added products of millets. Thus the focus on food security policies are giving more attention to millet production and processing for its better utilization to mitigate hidden hunger in the world. Thus due to readily available nutrients and energy sources in millets, scientists, agriculture industries, and food security policies are giving more attention to millet production and processing for its better utilization to mitigate hidden hunger in the world.

Keywords: *Millets; chronic diseases, nutritional bioavailability; organoleptic properties; antinutritional factors.*

Adequacy of ohmic blanching on the quality characteristics of blanched mango (*Mangiferaindica*) cubes

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Abstract

This study deals with the changes of bioactive and antioxidant components as well the sensorial properties in both ohmic and conventional blanching methods in a comparison with fresh green mangoes. An ohmic heater was developed of 1000 ml capacity for the research purpose, efficiency of that heater was checked as ohmic blancher. Fresh green *Totapuri cv*. mango cubes (1x1x1 cm) were taken for this research. Adequacy of blanching was tested at 30 seconds interval for the enzyme peroxide reductase using guaicol and hydrogen peroxide. The blanching time was observed to be 130, 110, 60, 50 and 40 seconds for conventional heating (CH) and ohmic heating at 10, 15, 20 and 25 V/cm (OH10, OH15, OH20, OH25) respectively. Further the blanched samples were tested for quality analysis. Among the extraction methods (methanol, acetone and water) methonolic extraction method was found to best, as the highest values was found DPPH, FRAP and TFC in samples irrespective of the blanching methods the samples were subjected to. The blanching at higher and lower voltage gradient (25 and 10 V/cm) along with in conventional blanching reduced most of the phytonutrients and sensory properties. Color measurement indicated that OH15 and OH20 possessed all color attributes (L, a, b, C_{ab}*, h_{ab} and ΔE) very close to those of raw mango cubes. Overall analysis suggested the samples blanched at 15 and 20 V/cm retained most of the quality properties when compared with conventional blanching.

Key words:*Conventional heating (CH), Ohmic heating at 10 V/cm (OH10), Ohmic heating at 15 V/cm (OH15), Ohmic heating at 20 V/cm (OH20), Ohmic heating at 25 V/cm (OH25), 2,2-Diphenyl-1-Pieryl Hydrazyl (DPPH), ferric reducing antioxidant power(FRAP), Total Flavonoid Content (TFC)*

Ultrasound assisted valorization of *Citrus limetta* peel waste into pectin

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Abstract

Pectin is an industrially important compound that is used as a food additive or gelling agent. Extraction of pectin from C*itrus limetta* peel is an economic and eco-friendly approach to obtain pectin while simultaneously reducing the waste management problem. Pectin is a cementing material between plant cell walls, comprising of repeated units of galacturonic acid (GalA). Ultrasound Assisted extraction (UAE) of pectin from *Citrus limetta* peel was investigated and optimised using Response surface methodology (RSM). To optimize the extraction conditions, a five-factorial Box–Behnken design (BBD) was employed with varying process parameters such aspH (1-3), extraction time (5-32 min), duty cycle (5-25 sec), amplitude (40-100), and liquid-solid ratio (14-30). Based on the series of experiments the optimum conditions for pectin extraction were at pH 1 for 19 min extraction time at amplitude of 70 with a duty cycle of 15:15 and solid liquid ratio of 1:22 g/mL. The maximum yield obtained in the process was 35.582%. The predicted values (27.030%) of BBD were further validated and were found in agreement with experimental yield (25.326%). The moisture content, ash content, and degree of esterification were 8.9%, 2.33%, 64.03% respectively. FTIR analysis also confirms the functional groups similarity between commercial and extracted pectin. UAE significantly reduces extraction time, temperatures, and energy consumption of the process. Thus this process can be efficiently employed to meet the global demand of pectin.

Keywords: *Ultrasound Assisted Extraction, pectin extraction, Citrus limetta pectin, eco-friendly valorization, food waste mitigation.*

Molecular Engineering to Modify Glycemic Index in Starchy Food Products

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Abstract

Glycemic index is the measure of how fast carbohydrate gets digested under the action of certain enzyme system. Thus, any organizational modification in starch leads to variation in glycemic index. To be specific, glycemic index has direct relationship with types of starch such as, rapidly digestible starch, slowly digestible starch and resistant starch. Further, the type of starch can be characterized by starch crystallinity and the same is most important determinant of glycemic index in starchy food products. The present study was undertaken to understand the effect of crystal type, crystal size and crystal perfection resistant starch content in starchy products. The effect of hydrothermal treatment on crystallinity, type of crystal, crystal size, perfection and resistant starch of the starch product was studied under a full factorial experimental design. The findings suggested that, crystal size increment and improved perfection was observed to be the prime factor to regulate resistant starch content in hydrothermally treated starch. The crystal diffracted at $2\Theta = 7.5^{o}$ is the most thermally stable crystal followed by crystal diffracted at $2\Theta = 13^{o}$ and 20^{o}. Most importantly, the size and perfection of the crystal diffracted at $2\Theta = 13^{o}$ was found to be the prime governing factor for resistant starch content starchy product and the same do significantly governs the glycemic index in starchy products.

Keywords: *Crystallinity, Crystal size, Crystal perfection, Glycemic Index, Starch*

Radish greens: Waste to worth

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Abstract

Global population has developed at a greater pace in the course of the last few decades which has led to the change in food preferences and consumption patterns of consumers. Consumer are more apprehensive about their health and health benefits in their diet. The awareness for healthy food is increasing so the consumers are likely to switch to fresh fruits and vegetables. But the by-products and wastes which are generated from this fruits and vegetables are high for example shoots of root vegetables like radish, turnip, beetroot, etc., are repudiated, even though it's healthy and nutritious for human consumption. Radish (Raphanussativus) which belongs to the family of Brassicaceae is one of the important root vegetables grown and consumed all around the world. Radish is consumed raw as a salad, cooked as vegetable and in some parts of the world it is pickled, whereas in Middle Eastern countries its juice is a pursuit as health tonic due to its health benefiting property. It is also ranking amongst the vegetable with high antioxidant property, which is due to the presence of various bioactive compounds like ascorbic acid, glucosinolates, phenolic compounds, flavonoids and their derivatives. This compound minimises the occurrence of diseases like cancer, diabetes, digestion, liver and kidney problems etc., The nutritive value of this vegetable is also high which if incorporated in the diet will provide basic supplements demand of the body.

Keywords: *Brassicaceae, radish root, radish leaves, bio-waste, bioactive compound, antioxidant.*

Optimization of culture conditions and media for the production of biocellulose through *Acetobacter aceti*

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Abstract

Bio cellulose is used in different fields as a biological material due to its unique properties. Despite there being many bio cellulose applications such as a food packaging material, wound dressing material, artificial skin, artificial blood vessels, etc, there still remain many problems associated with bioprocess technology, such as increasing productivity and decreasing production cost. New technologies that use waste from the food industry as raw materials for culture media promote economic advantages because they reduce environmental pollution and stimulate new research for science sustainability. For this reason, bio cellulose production requires optimized conditions to increase its production. The main objective of this study was to evaluate bio cellulose production by *Acetobacter aceti* using different media such as fruit wastes, milk whey, coconut water, sugarcane juice, mannitol broth (selective media), and Hestrin and Schramm broth (media used for bio cellulose production) as culture media. Furthermore, different culture conditions like time, temperature, and pH were also optimized for highest bio cellulose production. The highest bio cellulose (45.735 mg/mL) was produced at pH 5, on 7^{th} day of incubation when cultivate in selective media. The optimum temperature for bio cellulose production was found to be 30 ºC. Although, all culture media studied produced bio cellulose, the highest bio cellulose yield (90.25 mg/mL) was achieved with the fruit wastes media. This culture media can be considered as a profitable alternative to generate high-value bio cellulose. In addition, it combines environmental concern with sustainable processes and can also reduce the production cost.

Spray – freeze – drying an alternative approach for drying of foods and allied products

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Abstract

Spray-freeze-drying (SFD) is an unconventional freeze drying technique that produces uniquely powdered products whilst still including the benefits of conventionally freeze dried products. SFD has potential applications in high value products due to its edge over other drying techniques in terms of product structure, quality, and the retention of volatiles and bioactive compounds. In cases where other drying techniques cannot provide these product attributes, SFD stands out despite the costs and complexities involved. Spray-freeze-drying (SFD) involves spraying a solution into a cold medium, and freeze-drying the resultant frozen particles, which can be performed by contacting the particles with a cold, dry gas stream in a fluidized bed, typically at atmospheric pressure. This enables much faster drying rates than are usually possible by conventional freeze-drying, due to the small particle sizes involved. Compared to the classical freeze-drying process the various differences can be pointed out *viz-a- viz* improved heat and mass transfer between the circulating drying medium and the frozen sample; high and homogeneous quality properties of the dry product with an increased retention of volatile aromatic compounds in foods; and A fine, free-flowing powder with a large inner surface area and good instant, i.e. Wetting and solubility properties can be obtained.

Keywords: S*pray drying, spray freezing. Freeze drying.*

Techno functional properties of chenopodium album L for further utilization

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Abstract

Food from plants have been chosen for eating purposes because of their medicinal and health promoting benefits. Components like antioxidants, phenols, alkaloids and flavonoids present in them exhibit functions as anthelmintic, laxative,antiviral, antifungal, anti-inflammatory, anti-allergic, anti-septic, anti-pruritic etc. Presence of various minerals, vitamins and high quality proteins, carbohydrates and lipids helps in performing various functions in human body. Exploring the nutritional profile of weedy plant is off great advantage that will change the perspective of people towards weeds, *Chenopodium album* a commonly known weed have purpose full perspective apart from crucial nutritional benefits, it possess nutraceutical and functional properties. Leaves of this plant is used in various extruded products to make them more nutritious and heathier. Therefore in the present study tray drying technique (14 hours at 50°C) has been used to explore the storage stability and further utilization of its leaves in powdered form. The powder was segregated with the help of sieve shaker on the basis of granule size which was 36 BSS, 52BSS, 76BSS, 100 BSS, 200 BSS and 300 BSS. The powder collected on each sieve was then analyzed for properties like bulk density, compact density ,tapped density, porosity, wettability, hygroscopicity, solubility, sink ability, angle of repose, fat absorption index, water absorption index, foam capacity and stability, carr index, hauner Ratio index. Among these powder with granular size of 300BSS was found appropriate for storage stability and further utilization in food products.

Key Words: *Chenopodium album, powder properties, sieve shaker, tray drying*

A comprehensive approach on glass transition and their effect on food product qualities

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Abstract

The glass transition phenomenon has been used to study the stability of food products. It can be utilized as an integrated action along with water activity, physical and chemical changes in food during processing, and storage to determine oxidation reactions, non-enzymatic browning, and microbial stability of the food system. The temperature at which the amorphous system gets converted from glassy to rubbery state is called as glass transition temperature (Tg). Various techniques like differential scanning calorimetry, dynamic mechanical analysis, and NMR, etc. has been evolved to determine Tg. Different theories have been given to explain the concept of Tg and its relation to changes in the food system. Glass transition temperature (Tg) is an essential tool used to modify the physical properties of polymer molecules. The atoms/molecules in the glassy state are dependent only on vibration and not rotational and translational and motion. The Tg varies according to the types of components and the water content of the food. Many phenomena such as reaction rate of non-enzymatic browning, powder caking,stickiness, crispness of foods, crystallization of amorphous sugars, recrystallization of gelatinized starch, and frozen foods, ice formation and rates of non-enzymatic and enzymatic reactions and also freeze-drying can be explained by glass transition. Various factors, such as a structural change in molecules, cooling rate, and incorporation of additives, alter the Tg of the food system. The shift in glass transition temperature has been carried out to improve the dissolution and bioavailability, processing, and handling qualities of the material.

Keywords: *Amorphous, Crystalline, Glass transition temperature, Calorimetry, Bioavailability, Stability.*

Physiochemical and sensory characteristics of extruded product fortified with chickpea flour

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Abstract

In this study chickpea (*Cicer arietinum* L.) is used to fortify the extruded product by mixing with semolina to enhance the protein content in expanded snacks by using single screw extrusion. A central composite rotatable design (CCRD) and response surface methodology (RSM) was applied to evaluate the significance of independent variables [meal ratio (10.85-39.14) and feed moisture (12%- 27%)] and their interaction effect with extrusion process variables on the product's functional properties (Bulk density, Expansion Ratio, Color, Texture Analysis and Water Solubility Index) and sensory properties (Flavor, Texture and Overall acceptability). The sensory evaluation of the extruded products was analyzed by panelist on a 9 point hedonic scale. A second order polynomial regression equation was developed to relate the product responses to process variables as well to obtain the response surface plots. The coefficients of determination R^2 of all the response variables were higher than 0.80. The independent variables had significant (p<0.05) effect on functional, sensory and textural properties of extruded products. Higher feed moisture content decreased expansion ratio, color values and water solubility index. Expansion ratio and water solubility index first increased and then decreased with increase in meal ratio whereas bulk density first decreased and then increased in meal ratio. Based on RSM, the optimized formulation for development of chickpea semolina extruded snacks was 35% meal ratio and 15% moisture content. It also had a positive effect on water solubility index of extrudate. Sensory attributes also increased while L-value decreased with corresponding increase in chickpea concentration. Addition of chickpea in extruded product increases nutritional value and can be recommended in various supplementary programs.

Key Words: *Chickpea; Semolina; Extrusion; Functional properties; Sensory Attributes.*

Use of household processing for pesticide residue dissipation in fruits and vegetables

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Abstract

Monitoring of pesticide residues in Fruits and vegetables and their processed products like Jams, Pickles, Juices, Ketchup, dried products and canned products was undertaken. The study was conducted to assess the changes in concentration of various pesticides due to washing, peeling, heating, cooking etc. The stability of various pesticides in samples and their products was assessed. Pesticide residues were extracted using QuEChERS method and analysed by GC-MS. It was observed that pesticides like Mancozeb and carbofuron were found to be stable in case of tomato and potato while as pesticides like chloropyriphos, captan and Mancozeb (in other samples) were found to be unstable. It was also observed that Peels and Pomace showed highest levels of residues. Washing, peeling and heat processing (Boiling and Blanching) where found to be the most effective ways of pesticide residue dissipation.

Effect of organic acids on various quality attributes of the traditional meat product during different storage conditions

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Abstract

The main aim of carrying out this study was to evaluate the effect of different organic acid salts and storage conditions on various quality parameters of traditional meat products. Sodium diacetate (SDA) was used at the level of 0.25%, while as potassium lactate (PL) and calcium lactate (CL) were used at the concentration of 2.5% each. The total plate count (TPC) of SDA treated samples was very low (1.9 $\log_{10}$ cfu/g) as compared to PL (2.5 $\log_{10}$ cfu/g) and CL (2.1 $\log_{10}$ cfu/g) treated samples under refrigerated storage as compared to ambient storage. Lowest value for TBARS (1.9 mg MDA/kg) and free fatty acid (3.2%) was retained by the SDA treated sample at the 15th day of refrigerated storage. Significantly ($P \leq 0.05$) higher values for L*, a* and b* were maintained by SDA treated samples as compared to control, PL and CL treated samples under refrigeration conditions throughout the storage period.

Key word: *Organic acid salts; meat products; total plate count; free fatty acid; refrigeration*

Characterization and application of alkaline protease from a newly isolated strain of Bacillus *paramycoides*

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Abstract

The proteolytic enzymes are the most significant group of commercially produced enzymes. Alkaline protease found to have a long history in applications of food industries. For any enzyme to be applicable in food industry, it is necessary to characterize the enzyme for its optimum pH and temperature especially for the enzymes from new sources. The alkaline protease was produced from the newly isolated strain of bacillus *paramycoides*. Therefore, the aim of the present study was to characterize the alkaline protease isolated from the new strain and to find the applications of the enzyme in food industry.The ideal temperature and pH for protease activity was found out to be 40°C and 8 respectively. The maximum activity of enzyme at such milder conditions suggests that it can be a potential candidate for food industry.Further the effect of various inhibitors such as dithiothreol, PMSF, organic solvents and metal ions was determined on the activity of alkaline protease. The purified enzyme was tested in food application and it was observed that the functional properties of enzymatically treated soy protein isolate were improved to the greater extent after hydrolysis. The hydrolysates showed better antioxidant activity and protein digestibility as compare to unhydrolyzed soy protein, therefore they can be considered as potential candidates for functional foods.

Keywords: *alkaline protease, characterization, soy protein hydrolysates, functional properties, antioxidant activity*

Food irradiation: history and future prospects

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Abstract

The exposure of food to the ionizing radiations, which are emitted by the radioisotopes such as ^{60}Co (Cobalt 60) and ^{137}Cs (Caesium 137) or the other high-energy electrons and X-rays, under the specific and controlled environmental conditions is known as food irradiation. It has been observed that there is no significant impairment in the nutritional quality of the protein, lipid, and carbohydrates compositions. None of the vitamins and minerals were destructed. The irradiation almost protected the nutritional composition of the food by utilizing the low temperature during irradiation. The irradiation technique can be applied on the commercial level for inhabitation of the sprouts, disinfection of insects, killing of food borne pathogens, an extension of shelf life of perishable fruits and vegetable products, and irradiation of spices, which will improve the microbiological and parasitological safety of the foods. All of these will be helpful in the achievement of the extended shelf life of food products and will reduce storage losses. Hence, food irradiation finds a wide range of applications in the food industries and stands as a sustainable option in the food-processing sector. This paper summarizes the history and the future prospects of food irradiation.

Keywords:*radioisotopes; X-rays, irradiation; microbiological; ionizing radiations*

Effect of storage on starch content of amorphophallus paeoniifolius (elephant foot yam)

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Abstract

Bio-plastics are those forms of plastics which are obtained from plant sources such as potatoes, soybean oil, corn starch, sugarcane. Among the natural polymers, starch has been considered as one of the most promising candidates for the synthesis of biodegradable film because of its attractive combination of price, abundance, renewability and biodegradability. Films developed from starch are described as isotropic, odourless, colourless, non-toxic and biologically degradable. An underutilized tuber *Amorphophalluspaeoniifolius* (Elephant Foot Yam) contains starch as the major component and thus, can act as a raw material for development of biofilms. The present study was conducted to study the comparative analysis of elephant foot yam corm with respect to physico-chemical properties and total starch content under different storage time i.e., at 0 days after storage, 30 days after storage, and 60 days after storage at ambient temperature. No major significant differences were observed in physico-chemical properties. However, the moisture content and total starch content varied significantly with a maximum of 5% moisture loss at 60 days after storage which could be due to transpiration, respiration (i.e. 80% moisture content, average total starch content 15.85%), 2% moisture loss at 30 days after storage (i.e. 82.58% moisture content, average total starch content 19.8%), and at 0 days after storage 85.86% moisture content and 24.5% total starch content were found. Results of ambient storage reveal that, there was a significant decrease in total starch content with the increase in storage time which could be due to conversion of starch into sugar and respiratory loss of sugar as carbon-dioxide. Hence, for the maximum utilization of biotic components (starch) for the development of biodegradable films, storage plays a major role. The study concludes that starch extraction should be done from fresh corm without storage for maximum yield.

Keywords: *Amorphophalluspaeoniifolius, Biofilms, Bio-plastics, Elephant foot yam, Starch, Storage, Total starch content, Weight loss.*

Fabrication and characterization of nano encapsulated resveratrol, its bioactivity retention and release behaviour under gastro intestinal conditions.

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Abstract

Resveratrol is unstable to light, heat, enzymes and gastrointestinal conditions and hence poorly absorbed by the human body, which offers a wide drawback for imparting health beneficial effects during consumption in free form. The resveratrol was therefore, nano-encapsulated in three different sources of starch from Water chestnut, Horse chestnut and Lotus stem to protect it from gastric conditions and to improve its bioavailability and bioactivity upon digestion. The nano-capsules were prepared using safe and eco-friendly ultra-sonication method and studied for encapsulation-efficiency, particle-size and zeta-potential measurement. These were also characterized by ATR-FTIR, SEM, XRD and DSC. The release behaviour of resveratrol and its activity against anti-diabetic and anti-obesity were also studied. The particle size of HSR, LSR and WSR was found to be 419, 797 and 691 nm with a zeta potential of -16.09, -24.28 and -14.77 and encapsulation efficiency of 81.46, 75.83 and 79.37%, respectively. The nanoparticles showed porous or film-like structures with decreased crystallinity and higher transition temperatures. The maximum percentage of resveratrol was released in intestinal juice and exhibited higher anti-obesity and anti-diabetic activities than free resveratrol after digestion.

Machine vision based decision support system for quality evaluation of dairy products

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Abstract

Machine vision is the technology used to provide imaging based solutions in all industrial and non-industrial applications. Machine vision system (MVS) was developed for color measurement of dairy products and decision support algorithm was integrated. It consisted of a cabinet, illumination unit, camera and an image processing unit. Image processing capability of Scilab software was explored for food colorimetry and the system was developed for CIE L*a*b* color measurement. Decision support system (DSS) was developed to automatically determine quality pass/fail on the basis of color values. The four test products viz skim milk powder, flavoured milk (Rose), flavoured milk (Almond) and flavoured milk (Cardamom) having color values with range were classified as QC pass. The samples of mozzarella cheese and processed cheese were correctly classified as QC fail by the DSS.

Keywords: *Machine vision system, Decision support system, Dairy products*

Encapsulation of probiotic with different carriers by spray drying

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Abstract

Probiotics are widely being used in the food industry owing to their abilities to enhance the gut micro flora and provide several other health benefits. In the present study, an attempt was made to prepare stable probiotic powder. The study was carried out to evaluate the effect of various carrier materials such as Maltodextrin, Whey protein, Pectin and Gum acacia on spray dried encapsulated probiotic powder. The probiotic culture used was *Lactobacillus casei* (MTCC 1423). Maltodextrin carrier was used in 10%, 20%, 35%, 50% w/v. The maltodextrin (35%) was used in combination with Pectin (2%) and Gum acacia (2%). Moreover, Whey protein (5%) in combination with 1% Pectin was used in this study. The study was carried out using various inlet temperature (110°Cto 150°C), feed flow rate (1ml/min to 5ml/min) and nozzle diameter (0.5mm to 1mm). The results showed that better encapsulated probiotic powder can be prepared by using 35% maltodextrin at 135°C when feed flow rate and nozzle diameter was maintained about 1ml/min and 0.5mm respectively.

Key words: *Encapsulation, lactobacillus, spray dying, maltodextrine, probiotics.*

Novel and innovative green techniques for extraction valuable bioactive nutraceutical components from food waste

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Abstract

Food waste, a by-product from industrial, agricultural, household or other food sector activities, is rising continuously due to increase in such activities. Several studies have indicated that different kind of food wastes obtained from fruits, vegetables, cereal and other food processing industries can be used as potential source of bioactive compounds and nutraceuticals which has significant application in treating various ailments. Different secondary metabolites, minerals and vitamins have been extracted from food waste, using various extraction approaches. Fruit processing wastes are especially considered as valuable resource owing to presence of a broad spectrum of bioactive moieties including polyphenols, antioxidants, proteins, dietary fiber, enzymes, flavoring aromas, organic acids, and minerals. Scientists are trying to recover various bioactive compounds from these wastes through specific extraction techniques, i.e. conventional and novel techniques. Applications of food processing waste in food, textile, cosmetic, and pharmaceutical industries can be increased through the extraction of bioactive moieties by various methods. Functional foods commonly incorporate some plant extract(s) rich with BACs produced by conventional extraction. This approach implies negative thermalinfluences on extraction yield and quality with a large expenditure of organic solvents and energy. On the other hand, sustainable extractions, such as microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), high-pressure assisted extraction (HPAE), high voltage electric discharges assisted extraction (HVED), pulsed electric fields assisted extraction (PEF), supercritical fluids extraction (SFE), and others are aligned with the “green” concepts and able to provide raw materials on industrial scale with optimal expenditure of energy and chemicals.

Key words: *Green extraction,Novel extraction methods, food waste, utilization*

Exploring beta-glucan as nanocarriers for rutin as a model bioactive compound

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Abstract

Rutin is flavonoids with tremendous nutraceutical property, but its astringent taste, flavor, low solubility, stability and bioavailability curb its use as a bioactive compound in different food and pharmaceutical industry. However, this constraint can be overcome by using food grade nano-carriers. In this work, dates beta-glucan (D-Glu) and Mushroom beta-glucan (D-Glu) nanoparticles obtained by ultrasonication for rutin nanoencapsulation were used to put an end to fortification problems and deliver improved functional foods. The rutin capsules prepared from dates and mushroom beta-glucan (En-Ru(D) and En-Ru(M)) displayed a hydrodynamic diameter of 314.04 and 482.21nm with a polydispersity index of 0.21 and 0.33, encapsulation efficiency (EE) of 89 and 91% respectively. Fourier transform infrared (FTIR) spectroscopy revealed the interactions between the rutin and chemical groups of β-Glucan, indicating the successful entrapment of rutin in the β-Glucan matrix. *In vitro* digestion displayed increased bioavailability of rutin in intestines with significantly higher ($p<0.05$) retention of bioactivity with higher antimicrobial, anti-diabetic and antioxidant activities after digestion.

Keywords: *Flavinoids, release kinetics, antiobesity, antioxidant*

Approaches for production of functional meat-based products

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Abstract

People are becoming more health conscious and wanted food that provides both nutrition as well as health benefits to the body. Now, food is not only used to satisfy our appetite, but also to provide vital nutrients, which provides medicinal benefits in terms of infection and disease prevention. In last few years, specific attention has been paid by the researchers to the functional food because of their optimistic results on human health. Meat and meat products are good source of wide range of macro and micronutrients. Meat products have several disease-preventing, health-promoting benefits, makes them a viable option to be used as functional foods. Meat is commonly consumed in all over of the world. The functional value of meat can be enhanced by addition of various components such as conjugated linoleic acid (CLA), vitamin E, omega-3 fatty acids, selenium, phytosterols, natural antioxidants, and lactic acid bacteria. Thus, the present review discussed the strategies used for enhancement of the functional value of meat and meat products.

Keywords: *Functional food, nutrition, meat, antioxidants*.

Library resources & services in engineering college libraries in digital era: analysing the cases of engineering college across West Bengal

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Abstract

In the Engineering College Libraries of West Bengal, it has been noted that the data sources for the students are slowly and evidently changing toward online resources services. This is an eventful change for the libraries of the Colleges and encourages them towards more advanced systems of application of information technology in their daily lives. It is significant that the colleges have qualified personnel for handling and retrieving them and helping the students. For conducting this research, several research methodologies have been incorporated. The post-positivism type of research philosophy, descriptive research design method, inductive approach and both primary and secondary data collection process have been adopted. Moreover, total 66 EC in west Bengal and 32 number of literacy sources have been accessed. For analysing data, statistical tools have been utilized to determine use of e-resources in ECL system along with network connection, knowledge, consciousness and application of IT in library system. The current research paper has an impact on the Digital Era and Library Resources and Service of Engineering College Libraries in West Bengal (WB). The utilization of these resources is generally done by faculties, researchers and students of the 21st century.

Keywords: Engineering colleges, libraries, West Bengal, OPAC facility, electronic, resources, IT, software, security, subscribers, portals, passwords, book, vendor, websites, user, portal, IP address.

Effect of casein and whey protein interaction on the stability, antioxidant potential and bioaccessibilityof Sea buckthorn polyphenolsduringsimulated*in vitro* digestion

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Abstract

In this work,effect of casein and whey protein interaction on the stability, antioxidant potential and bioaccessibility of Sea buckthorn polyphenols during simulated *in vitro* digestion was investigated. The results revealed that both casein and whey proteins could increasethe stability of Sea buckthorn polyphenols during simulated intestinal digestion and protect theirantioxidant activity. Moreover, interaction with casein and whey proteinswould increase thebioaccessibility ofSea buckthorn polyphenols.The main bonding force between sea buckthorn polyphenols and the proteins was found to be the hydrophobic interaction as revealed by ATR-FTIR, UV-vis and fluorescence spectroscopy. The particle size of casein-polyphenol (CP and CPU) and whey protein-polyphenol (WP and WPU) complexes were in the nano-size region. Low span factors of polyphenol-protein complexes revealed the narrow range of particle size distribution and thus more homogeneity in particle size. This finding highlights that theinteraction between casein andwhey proteinswith Sea buckthorn polyphenolscould protect these bioactive compounds against influenceof simulated digestion.

Keywords: *Milk proteins, Sea buckthorn polyphenols, Simulated digestion, Antioxidant capacity, Bioaccessibility.*

Repurpose used cooking oil (RUCO): new health & eco friendly initiative

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Abstract

The practice of reheating & reusing of cooking oil is very much common. Cooking oil is often repeatedly used by mixing or topping it up with fresh oil. As per the FSSAI guidelines cooking oil which is used for frying should not be used more than three times. For the case of big manufacturing unit, hotel or restaurants they maintain the guidelines of disposal of used cooking oil (UCO) but the small scale food business or petty food vendors do not maintain reuse guidelines of cooking oil used for frying purpose & often dispose the used oil in non eco friendly way which can affect the environment and also causes blockage in drainage and sewage system. So in order to protect public and environmental health FSSAI has notified that the limit of Total Polar Compounds to be not more than 25% , beyond this limit the oil is unsafe for human consumption & can cause health hazards.

Key words: *RUCO, UCO, FSSAI, Total Polar Compounds*

Hypolipidemic Effect of Modern Used Formulation with Constituents & Modern Dosage Responses

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Abstract

The present study investigates the combined effect of ginger extract, garlic extract, lemon and apple extract on lipid profile and on atorvastatin induced rats .The results were also compared with the rats fed with traditional formulation -i.e ginger, garlic, lemon and apple cider vinegar along with honey. It was investigated that the combined administration of these four extracts i-e, ginger, garlic, lemon and apple cider vinegar takes much advantage over complementary effects and rats fed with traditional formulation. Histopathological study revealed that the combined administration reduced the liver lesions induced by atorvastatin. The results indicate that these 4 extracts lower the cholesterol and increase in the HDL, which is clinically important, because its chronic administration will neither lead to side effects nor to hepatic changes as occurs with high atorvastatin doses, therefore, combination regimens containing these extracts and a low dose of statins could be advantageous in treating hypercholestrolemic patients which are susceptible to liver function abnormalities.

Keywords: *Hypolipidemic; Atorvastatin; Ginger; Garlic; Cholesterol.*

Effect of incorporation of crude rice bran oil extract on storage stability of coconut oil

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Abstract

The effect of incorporation of crude rice bran oil extract (CRBOE) obtained from rice bran on storage stability of crude and refined coconut oil has been studied at room temperature for duration of 42 days. CRBOE, an agricultural by-product, was used as an abundant source of natural antioxidant and was added to oil samples at an optimum concentration of 5µl/gm. The storage stability of oil samples was analysed with and without addition of CRBOE at the interval of 7 days over a period of 42 days on the basis of parameters such as acid value and peroxide value. The crude samples were found to exhibit higher acid value as well as peroxide value upon addition of CRBOE as compared to those of refined ones. Even samples without CRBOE showed the similar trend as those with added CRBOE. It has also been observed that the rate of increase in acid value and peroxide value was found lower in case of samples with added CRBOE. Moreover, refined oil samples retained better stability under the room temperature storage than crude samples. Hence, the storage stability of coconut oil, used as cooking oil, could be enhanced by the addition of CRBOE which is believed to exhibit antioxidant properties.

Keywords: *Crude rice bran oil, coconut oil, natural antioxidant, storage stability.*

Antidiabetic evaluation of different varieties of mulberry grown in Kashmir and identification of their active metabolites by HPTLC- MS Bioautography

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Abstract

Mulberry is widely distributed throughout in Kashmir. This study was carried out to study the nutritional, antioxidant and antidiabetic properties of different varieties of white mulberry (*Morus alba*) namely, *Zagtul, Chtattatual, Chattatual Zaingir* and *Brentul Kashmir* grown in Kashmir. Diphenyl-picryl-hydrazil (DPPH) radical scavenging activity of the aqueous leaves extracts of the four mulberry varieties showed varying degrees of efficacy in a dose-dependent manner. The best antioxidant effect (DPPH) was recorded in *Chattatual Zaingir* (58.51% at concentration of 1000µg/ml). The highest total phenolic and flavonoid contents were observed in same variety (51.1± 0.44 mg gallic acid equivalents /g of dry matter and 131.22± 0.69 mg rutin equivalents / g of dry matter, respectively) while as best α glucosidase effect was found in *Chattatual Zaingir* (62.10 ± 0.53at a concentration of 500µg/ml). TLC-bioautography method followed by mass spectroscopy being novel and useful method in identifying bioactive compounds was employed in identifying antioxidant and antidiabetic compounds from best active extract. Many antioxidant compounds were identified in best active extract however, chlorogenic acid and hydrocinnamic acid were the major ones. 1, 4-dideoxy-1, 4-imino-D-arabinitol is which is polyhydroxylated alkaloid and has α glucosidase inhibition effect was identified in best active extract (*Chattatual Zaingir*). Further, UPLC-MS fingerprinting of the best active extract was done using acetonitrile and 0.5% formic acid in water as mobile phase in gradient elution mode.

Biosorption of Chromium through *Lactobacillus plantarum* and its Exopolysaccharides

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Abstract

Chromium (Cr) is a naturally occurring heavy metal. It is widely used in industrial processes, such as leather tanning, electroplating, metal finishing and chromate preparation processes and thereby, contaminated soil, sediment, surface and ground waters and many environmental systems. Nearly 80% of the tanneries in India are engaged in the chrome tanning process and most of them discharge untreated wastewater into the environment. In the present study most promising ecofriendly technique biosorption is used. *Lactobacillus plantarum* and its exopolysaccharide (EPS) are able to biosorb heavy metal chromium. Tests were performed at various conditions like pH (pH2.0, 4.0, 6.0, 8.0), temperature (37°C,42°C and 50 °C) and contact time (6, 24 and 48 hours). Chromium sorption by the selected strain and its exopolysaccharides was tested through atomic absorption spectrophotometer (AAS). Biosorption of chromium through EPS was higher in compared to viable cells. Exopolysaccharide show 100% biosorption while cell shows maximum 47% biosorption of chromium. *Both Lactobacillus plantarum* and its EPS show maximum biosorption at pH 4, temperature 37°C at 24 hours.The biosorption capacity of EPS extracted from *L.plantarum* is much better as compare to its cell. *Lactobacillus plantarum* and its EPS biosorption may be applied in metal detoxification of environment.

Verifying the optimum ultrasonic pulse mode for the encapsulation of gamma tocotrienol into high amylopectin rice starch

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Abstract

Gamma-tocotrienol (γ-T3, a Vitamin E component) was encapsulated into high amylopectin rice starch (HARS) using cavitation treatment with three different pulse modes of 2s/2s (HARS-γT3U_2), 5s/5s (HARS-γT3U_5) and 10s/10s (HARS-γT3U_{10}) ON/OFF and compared with the sample without treatment (HARS-γT3). Encapsulation efficiencyof HARS-γT3, HARS-γT3U_2, HARS-γT3U_5 and HARS-γT3U_{10} were found to be51.09±0.69, 48.34±1.67, 55.40±1.31 and 65.33±0.93 % respectively. In vitro digestion study showed a sustained release of 93.30±1.29 % of γ-T3 after 180 min of digestion by HARS-γT3U_{10}. The present investigation indicated that the application of ultrasonic treatment with 10s/10s ON/OFF pulse mode can effectively enhance the encapsulation efficiency and can be further studied in the food system to harness the nutraceutical benefits of γ-T3.

Keywords: *Ultrasonication; high amylopectin rice starch; γ-tocotrienol; encapsulation efficiency; gastrointestinal release.*

Extraction Optimization of Green Tea Beverage Using Response Surface Methodology

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Abstract

Salted green tea prepared with special tea leaves lacks on its scientific extraction optimization techniques. In the present study, the green tea sample was collected at the beginning of the first and second harvest seasons in 2018, and the extraction was optimized using response surface methodology. The effects of brewing conditions (temperature, time, water to tea ratio, and alkali concentration) on the yield, antioxidant activity, total phenols and the caffeine content of *Noon Chai* were studied. Central composite design (CCD) with 29 runs was employed using Design Expert 11.1.0.1 software. The experimental data were well-correlated by a second order polynomial model in predicting the response in terms of yield (R^2=0.96, $p < 0.001$), antioxidant activity (R^2 = 0.98, $p <0.001$), total phenolic content (R^2=0.98, $p < 0.001$) and caffeine content (R^2=0.96, $p < 0.001$). Alkali concentration had the greatest negative effects on the yield, phytochemical profile and caffeine content of tea infusion. The best conditions obtained were 88.63 °C temperature, 50 min time, 127.92mL/g water-to-tea ratio and 200 mg alkali concentration. The presence of secondary metabolites like pyrogallol, caffeine, diterpenes, fatty acids and phospholipids was also observed.

Changes in fatty acid composition and oxidative stability of commonly consumed edible oils of north India during deep frying

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Abstract

Deep frying has been the most popular practice of food preparation all over the world resulting in the formation of some undesirable products which have a negative effect on human health.In this study, thefrying performance of two commonly consumed vegetable oils refined soyabean oil and non-refined mustard oil was evaluated following (25 hours) deep-frying of French fries at 180 °C. The frying oils were investigated for fattyacid profile, and parameters of oxidative stability, such as iodine, free fatty acids peroxide, conjugated dienes and trienesand*p*-anisidine values. The colour of the frying oil was evaluated through hunter colour lab .The examination showed that the content of ΣPUFA in both oil decreased significantly($p < 0.05$) after 5 hours of deep-frying.Soyabeanoil presented a fatty acid profile prone to oxidation, and generated the highest level of peroxides atthe end of the thermal treatment. FTIR analysis of the oil samples showed that with increase in frying cycles peak intensities got increased at (3009, 2,925, 2,854, and 1745,and 966cm−1). The PCA was performed to evaluate the effect of Frying cycles on the quality characteristics of these two oils. The PCA graph of FTIRalso revealed the dynamic change occurred during deep frying in accordance with that obtained by chemicalmethods.

Chemical-residue-free pretreatment process of wheat bran for xylose recovery

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Abstract

Conventional chemical pretreatment of agro-industrial residues involves the use of 1-4% of acid/alkali which generates higher concentration of inhibitors along with reducing sugars, which affects the bioconversion of xylose to xylitol. Therefore, emerging perspective of chemical-free pretreatment strategies can be considered as a sustainable approach for valorization of agro-industrial residues. In this regard, pretreatment of wheat bran by Wet-air oxidation (WAO) for higher xylose recovery for xylitol fermentation was evaluated. The pretreatment of wheat bran by Wet-air oxidation was carried out in mild temperature and air pressure range for lignin removal and hemicellulose solubilization to generate xylose-rich fermentable hydrolysate. The results indicated that a maximum total reducing sugar of 69.09 gL^{-1} with total phenolics content of 3.57 gL^{-1} was estimated under optimal WAO conditions. The lignin can be significantly removed with minimal loss of hemicellulose. The pre-treated hydrolysate from WAO was quantified for xylose concentration of 41.95 gL^{-1}; that is equivalent to xylose concentration by chemical pretreatment method. WAO pretreatment was not found to generate any residues of sulphate and phosphate as compared with acid/alkali pretreatment. Therefore, chemical-residue-free pre-treatment process of wheat bran for the recovery of xylose can be a suitable approach for agro-industrial valorization.

Keywords: *Wet-air oxidation, Biomass loading, reaction time, reaction temperature, Xylose recovery*

Role of Atomic Force Microscopy in Food Science

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Abstract

Atomic Force Microscopy (AFM), was invented in 1985 by Binning, Quarte and Gerber. It is a member of scanning probe microscope family. It consists of a probe which is attached to a flexible cantilever. As the probe tip scans back and forth over the surface, a laser is pointed at the cantilever and it is reflected to a photosensor. The sensor collects both the topographical image and mechanical force on surface simultaneously. Thus, AFM can also be used to measure force-distance curves. This technique has become an important tool for researchers in the physical, chemical, material, biomedical sciences, and has also been widely applied in the field of Food Science. AFM for food protein nano-imaging includes sub-structural analysis of food proteins, interaction research between protein and other substances and processing effects on food proteins. It has also been used in the study of microorganisms, morphology characterization of polysaccharides and for assessing the nano-mechanical properties of food materials. As a powerful nano-technological imaging tool, AFM has many advantages over other techniques. AFM can image food proteins and provide a true three-dimensional surface profile, which will be useful for analyzing the height ofthe food proteins of interest and surface roughness of food protein-based biomaterials. Compared with many other imaging techniques such as optical microscopy, AFMhas high spatial resolution for food protein characterization. And therefore, the substructures offood proteins can be observed. Compared with scanning electron microscopy and transmission electron microscopy, AFM does not need complicated preparations or chemical modifications for sample preparation.AFM can also be combined with other microscopic and spectroscopic techniques.

Keywords: *AFM, Nanoimaging, Morphology, Microorganism, Structure*

Incorporation of encapsulated bioactives from saffron and sea buckthorn into Indian traditional milk based products (Dahi and Paneer) as a source of polyphenols for the elderly people of the world

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Abstract

The aim of present study was to prepare a nutrient-dense functional food product by adding multiple bioactives-loaded in oil in water (O/W) microemulsions into protein-rich traditional Indian milk based (Dahi and Paneer) products. High worldwide consumption of these products have opened the opportunity for designing a novel fermented dairy products as an extremely valuable functional food item, fortified with bioactivecomponents such as phenolics, flavonoids and carotenoids. In this way, daily diets can become more effective in reducing diseases associated with nutritional deficiencies as well as alleviate the problem of accumulation of food byproducts that are rich in bioactive components.The encapsulated bioactive incorporated products were also analyzed for *in-vitro* release under simulated gastric and intestinal conditions (SGIJD). The release was found highest in intestinal conditions and also displayed enhanced *in-vitro* anti-oxidant activities. The encapsulated bioactivesconsiderably improved the antioxidant activity of the products (Dahi& Paneer); therefore, it can be used for the development of these fortified products with high nutritional properties.

Innovative green technology for encapsulation of vitamin D_3 into β-glucan matrix using supercritical carbon dioxide

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Abstract

This study was conducted to investigate the effect of innovative green technology (supercritical carbon dioxide method) on the encapsulation of Vitamin D_3 into β-glucan matrix (Glu-VD_3). Glu-VD_3 was characterized using dynamic light scattering (DLS) and Fourier transform infra-spectroscopy (ATR-FTIR). The particle size of the Glu-VD_3 capsule was in the range of 85 – 110nm. FTIR revealed the interactions between the vitamin D_3 and chemical groups of β-glucan, indicating the successful entrapment of vitamin D_3 in the β-glucan matrix. The encapsulation efficiency of vitamin D3 was 88.31±24%. Further, vitamin D_3 loaded in β-glucan matrix showed controlled release behavior with increased antioxidant and anticancerous properties in the concentration-dependent manner. Therefore, it was concluded that the Glu-VD_3 can be used as an ingredient for different food products to enhance the bioavailability of vitamin D_3 and protect it from thermal degradation thereby enhancing the nutraceutical potential.

Keywords: *Vitamin D_3, β-glucan, Encapsulation, Supercritical carbondioxide*

Food *Supply Chain models applications in fresh agro produce*

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Abstract

This research aspects at the use of supply chain models in the management of fresh produce supply chains. Fresh produce supply chains encompasses the entire process of fresh produce production through consumption (fruits, flowers and vegetables). Supply chain management is a set of methods for integrating suppliers, manufacturers, warehouses, and stores so that merchandise is produced and distributed in the right quantities, to the right locations, and at the right time to reduce system-wide costs while meeting service level requirements. Supply chain management aims to reduce waste and increase efficiency in the production and delivery of products and services by identifying and removing the sources of high costs in operations. Fruit and vegetable segmentation is riddled with inconsistency and ambiguity. Integrated production and distribution planning has acquired a lot of popularity over the years, and its financial benefits have been widely established. However, for extremely perishable items, this integrated strategy must take into account the intangible value of freshness in addition to the economic considerations. A multi-objective framework with the benefits of incorporating both economic and freshness elements linked the operational planning issues and constructed models, where perishable commodities have a fixed and a lower shelf-life. The goal of this research is to highlight the applications and prospects in fresh produce supply chain research. Different techniques are presented, including modeling (linear programming, goal programming, dynamic programming, and stochastic programming), simulation (simulation, systems dynamics), and empirical research (field research, econometric models).

Keywords: Supply Chain models, agro produce, stochastic programming, shelf life

Evaluation of minimum fluidization velocity and terminal velocity of rice kernel

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Abstract

In this study the minimum fluidization velocity and terminal velocity of salt soaked preconditioned rice kernel was evaluated during fluidized bed preconditioning process. Rice was soaked in salt solution and preconditioned in fluidized bed drier prior to puffing to get puffed rice. The velocity at which the bed just begins to fluidize is known as minimum fluidization velocity. The minimum fluidization velocity was determined from a pressure drop and air velocity correlation. Minimum fluidization velocity was determined at 30% and 10% moisture content of rice. The fluidized beds had a transparent acrylic column, 10±0.1 cms in diameter and having a height of approximately 1.2m. Air flows into the bottom of the column and out the top. The volumetric flow rate of the incoming air was regulated by a butterfly valve and measured by a flow meter. The manometer was connected to the bottom of the fluidizing column for differential pressure readings. The minimum fluidization velocity of rice kernel at 30% (wb) moisture content was 0.95 $m.s^{-1}$ and at 10% (wb) moisture content was found to be 0.89 $m.s^{-1}$. The Archimedes number (A_r) of preconditioned rice at 30% (wb) moisture content and air at 25^oC was calculated to obtain the flow regime and the Archimedes number was estimated as 5.17×10^5. The fluidized bed preconditioning of preconditioned rice was in the turbulent flow regime. The terminal velocity of preconditioned rice was found to be 7.87 $m.s^{-1}$ at 30% moisture content.

Keywords: minimum fluidization velocity, terminal velocity, preconditioned rice, fluidized bed dryer

POSTER

PRESENATION

Utilization of maize (*zea mays*) by-product (corn cob) by extraction of cellulose

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Abstract

Corn cobs are one of the major agricultural by-product and are generated in huge quantities in India and other countries. Cobs are rich in lignocellulosic materials compared to the other agricultural by-products. Mainly Corn cob contains cellulose as their main component. These natural polymers are being used widely in various industries, especially textile, paper, and plastics. By considering the waste management practices and utilization this study was undertaken to develop an eco-friendly extraction process of cellulose from corn cobs which could be a good source for production of pure cellulose for industrial uses in different purposes. Along with the physicochemical properties of corn cob such as moisture content, ash content, fibre content and true density has been carried out.The cellulose was extracted by using various chemical treatments. The reason behind the chemical treatment during extraction process is to remove all the components of fibres like hemicellulose, lignin, fat and other components that left the cellulose at the end. Cellulose amounting 25% to 30% is extracted from de-waxed corn cob by various processes like hydrolysis, delignification and by chemical pre-treatment with NaOH at different chemical concentration (17.5% and 20%), temperature and time followed by extraction with KOH (10% and 24%) for removal of hemicellulose and bleaching with H_2O_2 (15 and 30 % concentration). The study concluded that the highest yield of cellulose content 30% was obtained with alkaline pre-treatment at optimized condition. The physiochemical properties of cobs such as moisture, fibre, ash content and true density were ranged 10.2-12.1%, 22-28%, 0.9%-10%, and 0.25-0.26 g/cm^3 respectively.

Valorization of Lotus (*Nelumbo nucifera* Gaertn): a review on characterization, health benefits and applications in food Systems

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Abstract

Lotus (*Nelumbo nucifera* Geartn) is an exclusive aquatic plant of which almost all parts are utilised for different purposes i.e.; as a vegetable, as a functional ingredient in food industry, in pharmacology, as an ornamental plant , is considered a blessed plant based on religious beliefs and many more. Lotus rhizome, leaves, seeds, stamens etc. are utilized in Asian continent and to some extent in Australia and Europe. Its unique bioactive constituents such as phenolic compounds, alkaloids, flavonoids, essential oils, tri-terpenoids, steroids, and glycosides with proven efficacy in improvement of health, clubbed with presence of adequate amount of dietary fibre, starch, vitamins and minerals, suggest its possibilities to be considered as a model plant and therefore researchers have potentially appropriate opportunity for its future valorisation and its application as functional additive and ingredient in health food industry ; keeping in consideration the challenges of its post-harvest management due to excruciating browning loss during storage. Nowadays a consumer explores all possibilities to find a blend of nourishment and medication in naturally available phytochemical rich foods. So, Lotus plant parts, especially rhizome which is already consumed as a vegetable with recognized phytochemical constituents can be further explored for its use as functional food so that it can become a promising model horticultural plant. In this review, we endeavoured to bring the available information about the plant on board, especially rhizome, which includes its proximate composition, bioactive constituents, functional behaviour, starch characteristics, health benefits, pharmacology, post-harvest management and processing, to explore its use in health food industry.

Keywords: *Rhizome; Starch; Food; Processing; Health; Nelumbo nucifera Gaertn*

Performance of indirect forced convection solar dryer with phase change material

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Abstract

The United Nations Food and Agriculture Organization (FAO) estimates that more than 40 per cent of food produced is wasted in India, which is due to poor storage and improper preservation practices. Proper drying practices can prevent bacterial, fungal and yeast growth on harvested produce enabling storage for an extended period of time. Increasing longevity of food by the method of drying is feasible than other preservation techniques and it already has established market demand, in India. Solar drier provides a sustainable solution in regions with abundant availability of sun's energy. Indirect type solar dryer (ITSD) is one of the prominent dryers used to dry food products and this type of dryer with its unique features, types and different technique incorporated to improve its performance. This paper aims to deliver a comparative study on different modes of drying practices with and without Phase Change material, drying kinetics, moisture content, drying rate, moisture ratio, dryer efficiency, collector efficiency, effective moisture diffusivity and performance analysis of the solar dryer, and its influence on various agricultural products like banana, chilli, tomato.

Encapsulation of A*maranthuspaniculatus* (Rajgeera) starch using spray drying

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Abstract

Amaranthus paniculates is a pseudo-cereal. It is a potential reservoir of starch and the properties of the end-use product are dependent on the starch. The present study investigated the effect of various carrier agents on the encapsulation of A*maranth paniculates* starch. The isolated starch from *Amaranth paniculates* is encapsulated using maltodextrin, whey protein isolates, guar gum, gum acacia and pectin. After encapsulation the starch is analyzed for its physio-chemical properties such as water activity, moisture, bulk density, tapped density, dissolution efficiency, flowability, cohesiveness, color, SEM and powder yield. Powder yield was found to be maximum for maltodextrin as carrier agent followed by whey protein whereas the minimum powder yield was noticed in guar gum.

Disease Preclusion through functional foods.

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Abstract

Functional foods are the food ingredients added in the food matrix for the provision of health benefits extended beyond the normal food nutrition. The concepts of malnutrition to the over nutrition emphasized the challenges of nutrient consumption, type and amount. The identification of phytochemicals, food hydrocolloids and zoochemicals in the food systems for the possible disease control pave a way forward in the field of functional food. The presence of antioxidants, bioactive compounds, and mineral matter in the different conventional and the modified food substances has resulted in the remarkable disease controlling assistances. The functional foods are said to exhibit pleiotropic (antioxidant, anti-inflammatory) cytoprotective, glycemic-regulatory and hypolipidemic activity. The disease like inflammatory bowel disease, obesity, non-alcoholic fatty liver disease, some cancers, organ damage, persistent hypertension, metabolic disease and cardiovascular can be treated by the ingestion of functional foods. The use of whole grains, fruits, vegetables, nuts, olive oil, fish etc. rich in functional ingredients help in prevention of various diseases in the indo-Mediterranean region. With the increased demand for food and change in dietary patters it's therefore essential to enrich, fortify foods with functional ingredients for the control of chronic health issues in future. The use of advanced food encapsulation technology to deliver the functional ingredients effectively in the food systems needs to be revived. The well establishment of the diseases and their cause needs to be studied and their remedy with the functional foods should be made possible with the necessary use functional foods.

Effect of octenyl succinic anhydride on rheological properties of Buckwheat starch

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Abstract

Objective:

Investigating the effect of octenyl succinic anhydride (OSA) on rheological and structural properties of Buckwheat Starch (BS)

Methodology:

Buckwheat starch was chemically modified with 0.5, 1, 2, and 3% OSA. Treated starch was then analyzed to study pasting properties, steady and dynamic rheology and X-ray diffraction pattern w.r.t. changes in rheological and structural properties.

Results and Conclusions:

The OSA treatment of BS significantly affected the pasting properties like pasting temperature (PT), peak (PV), breakdown (BV) and final viscosity (FV). The PT and FV was found decreasing with increase in concentration of OSA, whereas PV and BV showed opposite trends. Moreover, analysis of retrograded gel showed hardness which was significantly decreased from 0.71 N to 0.12 N after treatment with 3% OSA. It was found that control and 0.5% OSA modified starch showed non-Newtonian shear thinning behavior where apparent viscosity was found reduced with increase in concentration of OSA. However, BS modified with 1, 2 and 3% OSA showed almost Newtonian behavior at higher shear rates. The dynamic rheological parameter viz. storage modulus (G') was found decreasing with increase in concentration of OSA. However, the loss modulus (G") of starch samples had shown a different behavior which could be explained by the stability of starch viscoelastic behavior with increase in strain. The X-ray diffraction patterns of native and OSA treated BS showed conventional A-type pattern with characteristic peaks at diffraction angle 2θ of 15.50, 17.27, 18.31, and 23.03°. However, both native and OSA modified starch showed similar diffraction pattern suggesting very little changes in structural identity of BS.

Vacuum frying of gulabjamun

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Abstract

Objectives

The present study was designed to investigate the effects of vacuum frying on quality parameters like moisture loss, oil uptake, water activity, size, color, texture, and structure of Gulabjamun.

Methodology

The Gulabjamun spherical dough was prepared and fried in a vacuum fried pressure cooker at temperatures 125, 135 and 145 °C and pressures 15, 20, and 25 cm Hg. The oil temperature during frying was controlled by a voltage controller. After frying, the fried sample was collected from the fryer for further analysis.

Results and conclusions

Low pressure frying greatly affected the moisture and oil content of Gulabjamun, where the lowest moisture and oil was observed for sample fried at 145 °C, 25 cm Hg, 12 min and 145 °C, 15 cm Hg, 8 min, respectively. The maximum expansion in volume (75.10 %) for vacuum fried Gulabjamun was observed at 125 °C, 20 cm Hg for 10 min. The lightness and redness of vacuum fried Gulabjamun also improved following vacuum frying. On the other hand, hardness and springiness were found have reduced and increased respectively after vacuum frying. Finally, the structural analysis revealed that the porosity of vacuum fried Gulabjamun is significantly greater than normally fried balls.

Comparative study on the physical, functional and structural characteristics of rice cultivars (*Oryza Sativa L.*)

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Abstract

Background: Modern agricultural practices have replaced many traditional rice cultivars worldwide by accepting improved, high-yielding varieties, which led some types to the verge of extinction. The approach to explore nutritionally important, underutilized varieties offer a feasible and sustainable way of conserving traditional varieties.

Methods: Paddy samples were cultivated and processed to obtain milled rice. Physical properties, including length, breadth, thickness, equivalent diameter, sphericity, volume, surface area, aspect ratio, and thousand kernels weight, have been studied. Rice flour was prepared and sieved using a 100-mesh sieve. The functional properties like water absorption, oil absorption, swelling power, and solubility were analysed. SEM and FTIR were also carried out to study the structural characteristics of both rice cultivars.

Results: The results showed a significant difference ($p<0.05$) for almost every physical property evaluated, except breadth and thickness. The length (6.256 ± 0.38^{b}), equivalent diameter (2.994 ± 0.063^{b}), volume (13.876 ± 0.95^{b}), surface area (15.651 ± 1.09^{b}) and thousand kernel weight (19.666 ± 0.28^{b}) of Najar Bath (NB) variety is higher than that of Kumkum Sali variety (KS). There is no significant difference observed among the functional properties; oil absorption capacity, swelling power, and solubility. Water absorption capacity is slightly higher for KS (2.438 ± 0.05^{b}) than NB (2.27 ± 0.03^{a}). The SEM analysis showed a cluster of polyhedral structures for both samples, and peaks of similar functional groups were observed in the FTIR analysis.

Conclusion: The results show that there is a varietal influence on different characteristics of rice.

Keywords: *Rice cultivars, physical properties, functional characteristics, SEM, FTIR*

Application of edible coatings and active ingredients in shelf life extension of fruits

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Abstract

The rapid deterioration of fruits during pre and post-harvest conditions creates a significant issue in the current scenario. Fruits are affected by transport and preservation stages. The use of consumable coatings on fresh cut is a compelling strategy to improve their quality and thus increase the period of usability. The overall quality of food deteriorates from harvest until they are consumed. Deterioration of quality can be caused by microbiological, enzymatic, chemical or physical changes. The use of edible coatings is an excellent alternative to various carrier additives and bioactive compounds for food protecting against moisture loss, loss of volatiles, discoloration, gas permeability and microbial spoilage. Edible coatings have properties that make them suitable for use in increasing food shelf-life. Several polysaccharides like sodium alginate, chitosan and carboxymethylcellulose are natural polysaccharides used in plant agriculture food coatings and to improve/maintain fruit quality, product appearance improvement or in combination with active ingredients such as antioxidants, antimicrobials to further enhance food stability, quality, functionality and safety. Intake of fruits has been linked with various health benefits. Fresh fruits are welcomed by consumers due to the desire for new and natural products and for changing lifestyles. Freshly cut products has a much larger cut surface and consequently much shorter shelf life. The loss of quality parameters such as color, hardness, freshness, flavor and excessive humidity loss limits shelf life and increases the likelihood that consumers will reject the product. Application of novel food coatings would make it possible to meet the ever growing consumer demands and to approach the distant markets with comparatively high quality fresh produce Advances in coating technology can extend the shelf life of freshly harvested fruit.

Key words: *Edible coatings, Fruits, shelf life, antimicrobial*

The effect of edible coatings incorporated with Clove essential oil on the quality and shelf life of fresh fruits and vegetables

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Abstract

Consumption of fresh fruits and natural food products is increasing everyday as people have become more conscious for their health. Deterioration of these food product is a big concern as most of the healthy fruits are perishable. These days researchers are working in this field to provide a protective covering to such products for extension of the shelf life. Edible coating is being used widely for extending the shelf life and maintaining the quality attributes of different food materials. Perishable fruits are coated with this solution and positive results can be observed. Nano-emulsion is used to enhance the antimicrobial property of coating material and to reduce its interaction with other active components of food. Essential oils are being explored by many researchers and academicians in present times due to the presence of some extraordinary biological and medicinal properties in it. Out of hundreds of beneficial essential oils, clove oil carries enormous food preservative and pharmaceutical properties. Clove essential oil is incorporated with edible coating solutions to prepare nano emulsion. These days clove essential oil is considered as the most indispensable material in food researches due to its antimicrobial, antioxidant, antiviral and medicinal properties. Clove essential oil is derived from clove tree by extracting contents from the plant Syzygium aromaticum in order to underneath its various properties. It has various properties like antimicrobial, antifungal, antioxidant, antiseptic. Clove oil has practical application in food industry and it can be used as antioxidant as well as antimicrobial agent which extends the shelf life.

Keywords: *Clove Essential oil, Food preservative, Shelf life.*

Minimal processing of fruits and vegetables

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Abstract

With the growing awareness among consumers, fresh fruits and vegetables are perceived as healthier than heat-treated foods. Demand for minimally processed food is escalating due to busy lifestyles, increased purchasing power, and health-conscious trends. Consumers are increasingly demanding healthy, convenient, ready-to-use, and ready-to-eat fruits and vegetables with fresh-like quality containing only natural ingredients with the minimum use of preservatives and at the same time preserving the nutritive value, color, flavor, and texture of fresh-cut produce. This stimulates the search for processing methods with reduced application of high heat processing methods. Minimal processing is a technology which uses low temperature, has minimal influence on quality, retains sensory and nutritional characteristics, and provides sufficient shelf life during storage and distribution. Various novel processing techniques such as ozone treatment, UV-C radiation, ultrasound, cold plasma are being employed to extend shelf life of fresh cut produce without using any heat treatment. The use of edible coatings, natural antimicrobials are raising nowadays. Advanced packaging systems like MAP (Modified Atmosphere packaging), Active packaging (AP) as well as the use of combined hurdle technologies can help in extending the shelf life of minimally processed fruits and vegetables. This paper reviews the principles of minimal processing and the development of emerging techniques for the preservation of fresh-cut produce to satisfy consumer needs.

Key Words: *Minimal Processing, Food Processing of fruits and vegetable*

Novel extraction techniques used in food processing

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Abstract

Food processing is the transformation of agricultural products into food or of one form of food into other form. In food processing, extraction is the transfer of one or more components of a biological feed from its source material into a fluid phase, followed by the separation of the fluid phase and recovery of components from the fluid. The main objective of novel extraction techniques used in food processing is to recover valuable soluble components from raw materials by primarily dissolving them in a liquid solvent and sometimes extraction is intended to separate all the soluble compound from the residue. Environment protection agency has been much concerned regarding environment emissions associated with hexane used in solvent extraction. In this context, bio-solvent coming from renewable raw material and from biomass may become the solution for the problem, but the conventional extraction method can't respond to such solvent and hence the need is for novel extraction technology having potential to overcome all the limitations of existing technologies. This review focusses on the study of various novel extraction techniques used in food process and their implication on the food industry.

Key word: *Extraction techniques, Food processing*

Hurdle technology in food processing

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Abstract

Hurdle technology is the method of ensuring that pathogens in food products can be eliminated or controlled so that the final food products will be safe for consumption with extended shelf life. It is an effective food preservation approach which works with the combination of more than one approach (hurdles) which secure microbial safety and stability as well as organoleptic and nutritional quality and economic viability of the food products. The common hurdle approaches in food processing are High temperature during processing, low temperature during storage, High acidity, lower water activity or redox potential, or the presence of preservatives. This paper gives an overview of the principle of hurdle technology, types of hurdle use for food preservation, its synergistic effects, homeostasis, metabolic exhaustion, stress reactions, and multitarget preservation. These all are used to eliminate, inactivate or at least inhibit the unwanted microorganisms in food products thus making them safe and fit for consumption.

Key Words*: Hurdle Technology, Food processing and preservation*

Development of immune boosting, easy to digest nutritious ready to eat or ready to prepare sip feeds for the elderly

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Abstract

The proposal presented takes into account the rationale of using natural source of immunity, discarding any preservatives or artificial flavors and additives using modern technology. Collection of fresh produce followed by processing of fruits and vegetables, in the form of a veggie mix slushy which is ready to eat, ready to cook and easy to digest, through the use of sustainable retorting technology. It counters major problems regarding food for the elder like lack of digestion, in sufficient appetite, lack of value in terms of vitamins and minerals of food, also targeting the notion of feeling sick by taking multi vitamin and immunity tablets ona regular basis.

The product proposed could have variants to itself some of those would be taken into account through this proposal. Health benefits from the raw material individually have also been discussed. Studies suggest the nutrients in fruits and plants like; beta-carotene (antioxidant, reduces inflammation, increases WBC count), vitamin C and E (destroy free radicals, supports body's natural response), vitamin D (reduces risk of infections by reducing production of proinflammatory compounds, also is linked to prevention of chronic diseases like hepatitis, tuberculosis and cardio vascular diseases), zinc (boosts WBC's); contribute essential immune boosting factors.

The project study includes advantage of Retorting over dehydration and also focuses on Scale up and project costing. The factor of healthy food not being tasty is also eradicated through the project. It concludes all the essential vitamins and minerals responsible for boosting immunity and providing essential nutrients for the elderly as well as completing their fibre requirements. It also ensures a market bigger than what it is made for.

The rehydration behavior of oven dried Plectranthus amboinicus leaves

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Abstract

Plectranthus amboinicus (Indian Mint) leaves is a perishable herb with a relatively limited shelf life. The aim of this study was to create dried mint leaves with a longer storage life. Mint leaves were dried at three different temperatures: 318K, 323K, and 328K, as well as two different treatments (blanched at 363K for 2mins and control). The resulting formulations were dried in a BOD incubator, and the dried samples were evaluated for rehydration characteristics (Rehydration ratio and Rehydration coefficient) and sensory properties. The moisture content of the control samples decreased from 85.35 percent to 21.25 percent, while the moisture content of the blanched samples decreased from 85.50 percent to 18.95 percent. The rehydration ratio of the sample is decreased (from 4.84 to 4.30) with the decrement in temperature (from 328K to 318K) and control sample having higher values than blanched samples. Similarly, Rehydration coefficient for dried sample at 318K, 323K, and 328K (for blanched 0.86656, 0.74937, & 0.99260 respectively and for control 1.002410, 0.945821 & 0.955636 respectively) is obtained from the findings. The samples were evaluated for sensory characteristics and it was found that sample C2 (Control sample dried at 328K) was most accepted among of the samples.

Key words: *Drying, Moisture content,* ***Plectranthus amboinicus*** *leaves, Rehydration characteristics.*

Biodegradable packaging: a contribution to the elimination of plastic waste in landfills

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Abstract

Packaging plays a major role in the protection and shelf-life extension in the supply chain of a food product. Plastic based packaging has been widely used since decades. These materials made from petroleum based derivatives are expensive, takes many years for decomposing thereby polluting the environment. According to the report by Central Pollution Control Board of India (2013), about 15342 tons of plastic waste is generated every day across the country. Less than 5% of the plastics are recyclable and the rest pollute the land and water bodies thus, affecting the fauna and flora. Hence, alternative packaging (which we called biodegradable packaging), with a major emphasis to safe guard our environment is the needed measure to combat this issue. Biodegradable packaging is made from eco-friendly materials. Hence, it is easily recycled. Biodegradable food packaging typically refers to a product that takes less than 180 days to fully decompose. They require less energy to produce. They are non- toxic with reduced carbon emission and help to reduce climate change. Biodegradable products can decompose through biological processes with only the assistance of naturally occurring environmental conditions. Biodegradable packaging can be a best alternative to plastics when used in conjunction with metal containers. Based on the need of packaging different products, biodegradable packaging is produced in various forms viz., gels, film, bag and box. Gel as hydrogel applied as a coating on fruits and vegetables, helps prevent microbial contamination. Biodegradable films are made from renewable biomaterial like corn dextrose. Biodegradable films are resistant to moisture and are easy to compost. Biodegradable bags are also made from biomaterials. They are strong and resistant to breakage and considered safe for packaging food materials. Bio-oriented polystyrene from corn is used for producing biodegradable boxes with lid. There are a number of ways to make biodegradable and recyclable packaging items at home. Ideas include: Shred newspaper and magazines – this can be used as protective packaging when sending items through the post or storing things at home. The shredded paper will both biodegrade and can be recycled; Food packaging – instead of using disposable food packaging materials, consider using cleaned packaging from other food items. Clean ice cream tubs, for instance, have a variety of uses and reusing them in the home keeps the waste from land fills; Reusable gift packaging – consider presenting gifts in a fabric bag which could later be used as a shopping bag; Keep packaging to use again – for instance, keep large cardboard boxes or other containers for reuse. This is helpful to the environment as well as being a good way to save money.

Keywords: *Biodegradable, Eco-friendly, Environment, Packaging, Recycle.*

Texturizing sweetened yogurt with modified starch of black rice

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Abstract

Texture in yogurt is attributed to the physical cross-linking of protein matrix. The sweetened yogurt is characterized by a soft texture and firm body. Yogurt generally has defects like weak body, lumpiness and wheying off (syneresis), which in turn limit its shelf life and reduce the market potential. To overcome these problems industries use higher level of solid not fat which lead to increase in the cost of product. The current study was undertaken to improve the textural and rheological properties of sweetened yogurt substituting skim milk powder with modified starch derived from black rice. The starch was modified by hydroxypropylation method. The milk was standardized to 15% SNF and 3% fat to which 10% sugar was added for control sample. The yogurts containing 1, 1.5 and 2 wt % of both native and modified starch were prepared and textural and rheological properties were analysed. The firmness and cohesiveness values of yogurt added with modified starch were more compared to yogurt with native starch. The texture of yogurt increased with the increase in the level of starch addition, however up to a certain limit (≤2%). The addition of modified starch increased the elastic (increase in G') and viscous (decrease in tanδ) properties of sweetened yogurt. These values for native starch added yogurt were low which confirms that the starch modification improves the textural and rheological qualities of yogurt. Therefore, modified starch proved to be technological and interesting alternatives for manufacture of sweetened yogurt.

Process optimization of eggnog using response surface methodology

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Abstract

Eggnog is an egg yolk containing dairy beverage having homogenous blend of different ingredients including nutritive sweeteners, salt, flavours and stabilizers. It is considered as a popular holiday drink in United Kingdom, United States and Canada. Milk and eggs are highly nutritive with rich pool of bioactive properties such as antioxidant, antimicrobial, antihypertensive, antidiabetic, anticancer and anti-inflammatory properties. Presently, no commercial formulation of eggnog is available in India. Thus, the present work was designed to optimize the process and formulation of eggnog and analyse its physio-chemical, rheological, microbial, sensorial properties and heat coagulation time (HCT). The process included the whipping of yolk separately with sugar followed by addition of warm milk, cream and skim milk powder. Further, the mix was pasteurized and added with albumen. The formulation of eggnog was standardized using response surface methodology following a Box Behnken design using milk (60-75%), cream (25-40%) and eggnog (5-8%) as independent variables. The protein, fat, total solids, ash and lactose content varied from 5.65-11.93%, 11.61-16.98%, 25.76-34.38%, 0.55-0.82% and 3.75-4.02%, respectively. Viscosity increased with increase in the concentration of cream and eggnog base. However, no significant difference ($p > 0.05$) was observed for acidity and pH. HCT decreased with the addition of eggnog base whereas addition of cream increased HCT. Based on the above findings, the optimized formulation was further characterized. Four principal components with cumulative variance of 89.45% were extracted by the PCA of sensory score. The optimized eggnog formulation meets the USDA standards i.e. minimum 6% milk fat, 8.25% milk solid not fat and not less than 1% egg yolk solids.

Storage studies of blended marmalade

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Abstract

Marmalade is the product which is prepared from citrus fruits, where the peel of fruit is being suspended, which is having nutritional importance as it is rich source of ascorbic acid and other minerals. Blending is one of the best methods to improve the nutritional quality of a value-added product by providing the basic nutrients of various fruits in a single product, hence giving better quality in respect to nutritional as well as sensorial aspect. Thus, keeping this objective in mind, the present investigation was done for finding the best suitable combination of blended marmalade with respect to physico-chemical and sensory parameters. The experiment conducted at Post Harvest Technology Laboratory, Department of Fruit Science, Dr. PDKV, Akola in the year 2019-20. It was observed that, the treatment combination having 40% mandarin and 0% lime juicy vesicles was found to be best for the parameters TSS, total sugars, reducing sugars and sensory attributes whereas the treatment having 55% mandarin and 10% lime juicy vesicles for ascorbic acid content and acidity.

Drying characteristics of lemongrass in tray dryer

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Abstract

Lemongrass (Cymbopogon Citratus) is perishable, having shorter shelf life and medicinal usage. In this research work, drying study was undertaken to investigate the drying characteristics (moisture content, and drying rate) of lemongrass experimentally. Lemongrass leaves were dried at three different temperatures: 313K, 323K, and 333K, with two different sizes (2*0.5 & 4*0.5 cm^2). Lemongrass was dried for duration of 30 minutes and weight is measured for each five minutes interval. Moisture loss increased concerning increased in time, size and temperature of drying of the lemongrass leaves. The highest moisture loss is recorded for 4*0.5 cm^2 at 333K size of lemongrass leaves. The drying rate of lemongrass leaves under tray drying decreased as the drying time progressed and finally attained zero drying rates. Highest drying rate (0.317) obtained for 4*0.5 cm^2 at 333K and lowest (0.251) for 2*0.5 cm^2 at 313K of lemongrass leaves.

Key words: *Drying, Drying rate, lemon grass, Moisture content, Tray drying.*

Functional food applications of valorized pineapple waste

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Abstract

During processing, more than half of the whole pineapple fruit becomes waste owing to the inedibility of the crown and peel and the sensory discomfort caused by the core. In the Philippines alone, this equates to more than 356,000 metric tons of waste by mid-2019. In decades past, pineapple waste has been utilized for agricultural purposes (i.e. as fertilizer for plants or as feed for livestock). But in recent years, other uses, such as for paper production and fuel production, have begun drawing attention. Treading on the same course, the food industry has also begun exploring the applications of this waste in foodstuffs production, primarily in pursuit of isolating bromelain. But with the advent of the "healthy food" trend, attention has shifted to the natural products present in pineapple crown, peel and core, called phytochemicals. With the help of modern analytical techniques, these biochemical compounds have been found to be effective and potent in treating and preventing diseases. Hence, researchers have come up with novel ways to utilize these biochemical compounds from pineapple waste and turn them into high-value food products. This review investigated the most recent developments in researches aimed at valorizing pineapple waste into ingredients for functional food.

Refractance window drying of vegetables: a review

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Abstract

Traditional drying methods adversely affect the sensory qualities like taste, colour, nutritional qualities and preservation of bioactive compounds due to high-temperature exposure of the product. The substitute for traditional drying processes is consequently necessary to impart superior quality and preserve greater nutritional value in processed vegetables. Refractance window drying is one such technique that gained a lot of attention in recentyears, because of numerous benefits it claims. This technique involves drying purees and liquid vegetables placedover a thin infrared transparent film that essentially forms a 'window' through which drying occur.Refractance Window drying system has high heat and a mass transfer rate that speeds up the rate of drying process and more nutrients are retained. Refractance windowdrying produce high quality dried vegetables with low aroma and flavor loss.

Keywords: *Traditional drying, Refractance Window drying, Fruits and Vegetables and Nutritional qualities*

Effect of conventional and advance drying methods on plant oil powder and its application in food industry: a review

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Abstract

Shortenings perform various functions in bakery technology including batter aeration, emulsifying properties, improving keeping quality, providing lubrication and flavour. These vary in their consistency from liquid to high melting point plastic fats. In liquid form, these have certain limitations on temperature since product settling is observed while storing these at temperatures below 12-14°C. Also, these need careful handling and storage which makes it complex to transport it for commercial purpose where large amounts of products are being handled. Plant oil powder can eliminate the risk of oil spillage, reduce high transportation charges and simplify its storage. This review summarizes the effect of different drying methods such as spray drying, freeze drying, Refractance window drying on different plant oil powder and the quality variation in a different bakery product prepared from oil powder.

Keywords: *Oil powder, Conventional drying, Refractance window drying, Shortening and Bakery industry*

Biodegradable and edible coating polymer in food packaging industry

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Abstract

The development of biodegradable packaging and edible films/coatings have seen appreciable growth in recent decades and is expected to have an important impact on the quality of food products and the environment in the coming years. This progress is accredited to the increasing knowledge of packaging technology, as well as advances in materials science and processing technology. These types of packaging are using in order to reduce plastic and synthetic packaging, which causes harmful effects on humans and the environment. Biodegradable packages and edible coatings play a role as eco-friendly packaging materials and protect food and food products. A large number of biodegradable and bio-based polymers have been used in the packaging industry. Novel sources of packaging techniques are a subject of great interest due to their promising potential as innovative food packaging systems. This chapter presents the concept and potential for the application of biodegradable materials and edible coating/film for the packaging of foods.

Key words: *Biodegradable, Edible coating/film, Eco-friendly.*

Physical properties of fours rice cultivars of Indian temperate region

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Abstract

This investigation was aimed to study the effect of milling on physical properties of four rice cultivars (SR-4, K-39, MushqBudij and pigmented) grown in Kashmir. Brown and polished rice of the four cultivars were studied for grain dimensions, equivalent diameter, geometric mean diameter, arithmetic mean diameter, volume, surface area, sphericity, aspect ratio, bulk density, true density, porosity, thousand kernel weight, static coefficient of friction and colour. Milling caused significant ($p \leq 0.05$) reduction in grain dimensions, volume, and surface area and led to increase in sphericity and porosity of rice kernels. Brown rice from SR-4 variety revealed large values of length (6.36mm), geometric mean diameter (3.30mm) and arithmetic mean diameter (3.73mm). Thousand kernel weight (23.03g) was high for brown rice from pigmented variety. This research will be beneficial in fabricating machines for rice processing industry that would be helpful in eliminating post-harvest losses that occur during milling operation.

Keywords: *Milling, brown rice, polished rice, physical properties, colour, thousand kernel weight.*

Development of standardization recipe for nutraceutical chocolate bar by using herbal powder and quinoa

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Abstract

In the modern era, peoples are being health conscious but the available food items are insufficient to provide the proper nutrients through claimed food items. Indian traditional medicine like herbal powder has very high effectiveness and vital source. Value addition to nutraceutical-related confectionary products is a resource for the development of new medicinal and functional food items. The purpose of this research project is to develop a nutraceutical chocolate-based confectionery product that will provide benefits other than that of the traditional chocolate product. Herbal has functional as well as nutraceutical food is used as rigid support to maintain health and to promote optimal healthcare and quality of life. There is a need to produce some innovative confection products other than traditional chocolates. The nutraceutical chocolate bar which we have manufactured is more nutritious and healthier due to its rare ingredients which also makes it a unique nutraceutical chocolate bar. The raw materials required for the preparation of this bar like herbal powder is moringa and quinoa along with fruits like apricots, pineapple and nuts like almonds, cashew nuts, peanuts and desiccated coconut. For the standardization of formulation, four test samples were prepared of different proportions of raw ingredients, among which the T4 was selected by a sensory panelist based on the organoleptic evaluation. The bar was packed into aluminium foil wrappers. The approximate nutritional values obtained by analysis are particularly Protein 5.18gm, Fat 29.16 gm, Carbohydrate 37.28 gm and Fibre 22.8 gm. The storage conditions are studied at variable temperature conditions and recommended to be below 200^0C in a cool and dry place. The well-packed bars were studies for 4 months to determine their shelf life study.

Keywords: *Nutraceutical, Confection, Innovative, Organoleptic*

Novel food packaging technologies in food preservation: future need of the modern world

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Abstract

Packaging is an integral part of life and its demand is increased due to revolution in industrialization. Packaging helps in containment of products and now it continues to be most innovative preservation technology in preservation of processed foods. Novel food packaging systems (intelligent, smart/ active, antimicrobial and biodegradable/ edible packaging) are developed to meet the present and future need of modern world. Novel packaging system provides many functional advantages in addition to the packaging of food commodity. Novel food packaging systems offer specific functional values to foods during supply chain. Novel packaging system intended to maximize food product shelf-life along with an access to real condition of the food packed inside it. Novel packaging like fresh check indicators and color labels ensures the food quality till the product reaches to end consumer. In this packaging internal changes in product's environmental conditions are sensed/ detected/ controlled/ recorded for the preservation action. In case of bio based active packaging, controlled release of antimicrobial agents from packaging material requires optimization of ingredients, to increase the shelf-life of product by preventing microbial growth and food spoilage. Therefore, novel food packaging systems is an innovative approach to achieve best quality delivery of food products to consumers.

Keywords: *Intelligent Packaging; Antimicrobial-Packaging; Edible Packaging; Modified atmospheric packaging*

Effect of candy making and storage on physico-chemical and antioxidant properties of muskmelon (C*ucumis melo*) fruit

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Abstract

Muskmelon (*Cucumis melo*) is an annual or seasonal trailing herb belonging to Cucurbitaceae family. The present research was undertaken with the objective to develop the candy from medium-ripe muskmelon and to determine its storage stability over a period of 4 months at an ambient temperature. Muskmelon and its candy were analysed for various physicochemical characteristics like moisture content, ash content, total soluble solids, titratable acidity, and color. Antioxidant properties like total phenolic content (TPC), 1, 1-Diphenyl -2- picrylhydrazyl radical scavenging activity (DPPH), ferric reducing/antioxidant power (FRAP), reducing power, metal chelating activity and lipid peroxidation of methanolic extracts of fresh and processed candy were also evaluated. The processing of muskmelon into candy showed a significant increase in TSS from 6.5^0B to 75.6^0B and antioxidants like DPPH from 7.3% to 12.7%. However, other antioxidant depicting parameters like TPC, FRAP, metal chelating activity, reducing power and lipid peroxidation values varied non-significantly initially after candying. The storage of candy at an ambient temperature during the period of four months showed a significant increase in titratable acidity (0.06% to 0.127%) and a non-significant increase in TSS (75^0B to 79^0B). However, a significant decrease in moisture content (7.03% to 3.43%), ash (0.4% to 0.12%), TPC (4.31mgGAE/g to 4.27mgGAE/g), FRAP (4.15qMFe^{2+} to 3.94 qMFe^{2+}), DPPH (12.7% to 2.4%) and lipid peroxidation (4.3% to 1.6%) was observed. Further, a non-significant decrease in reducing power (22.6% to 20.6%), metal chelating activity (83.1% to 78.7%) and color were observed during storage. Further upon sensory analysis of candied samples after storage, it was observed that there was a significant decrease in almost all the sensory parameters. However, the scores were well within the acceptable limits even after storage. Therefore, it can be concluded that the muskmelon fruit, being a rich source of nutraceutical compounds can be successfully processed into candy, which will not only improve its shelf life but also maintain its antioxidant potential.

Key words: *Muskmelon, Antioxidant activity, Sensory evaluation.*

Synthesis of nanoparticles from plant gums: a review

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Abstract

Plant-derived nanostructures and nanoparticles (NPs) have applications in a number of fields, including health care, food and feed, cosmetics, biomedical research, energy science, drug-gene delivery, and environmental health.. Gums are hydrocolloids that are hydrophilic in nature and can be found in nearly every biosphere on the planet, including plants, animals, and bacteria. Various metal (Ag, Au, Pt, Pd, Fe, Cu, Se, etc.) and metal oxide (Fe_3O_4, CuO, ZnO, etc.) nanoparticles have been synthesized and stabilized using tree gums (GA, GK, KG, GT, and GG) as a template. Gums have three major parameters for NP preparation that obey the cardinal principles of green chemistry; namely, the environmentally friendly solvent medium (water and ionic liquid-based green solvents) for NP synthesis; Owing to the existence of several functional groups in the gum structure (–OH, –COO–, –CO, and CH_3CO–), gum serves as a reducing agent, and gums are non-toxic and biodegradable materials for NP stabilization. As a result, it is critical that Plants are cost-effective, sustainable, and renewable platforms, according to researchers. As a result, they are excellent sources of natural NPs.

Key words: *nanostructures, nanoparticles, Gums, hydrocolloids, biodegradable, cost-effective,*

Intermittent and stepwise decreasing microwave power drying (isdmpd) of selected green leafy plant materials

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Abstract

India is a major producer of Green leafy plant materials (GLPMs). GLPMs are used in food as well as in medicinal applications that is the old practice of human history. It is highly perishable having a very short shelf life. During their season, when greens are available in abundance, poor handling procedures and lack of proper storage facilities result in heavy losses. Conservation of greens to reduce losses and to make them available for consumption in the off-season is a matter of consideration. A novel drying technique viz. Intermittent and Stepwise Decreasing Microwave Power Drying (ISDMPD) was investigated for efficient dehydration of selected GLPMs like dill, coriander and mint leaves for optimal retention of color and its constituents. The treatment of decreasing power of microwave field i.e. 900 W, 720 W, 540 W, 360 W, and 180 W, respectively with decreasing levels of moisture was given to reduce heatstroke to selected GLPMs, those otherwise loose useful nutrients. The pulse ratio of 1.5 to 2 during microwave drying shows the best results concerning product quality and reduced final moisture content. The OFF time as per said pulse ratio during said drying helps in the retention of color with maximum nutrient. The variation in chlorophyll, protein, calcium, iron, and ascorbic acid between fresh and dried leaves was below 10 % as compared to other heat-intensive drying methods. The total drying time required for dill, coriander, and mint leaves was 9.25 min, 15.33 min, and 9.08 min, respectively for a fifty-gram sample of 0.20 g/cm^2 spread density. This drying process improves energy efficiency and product quality without increasing the capital cost of the drier and enables the drying without chemical pretreatment.

Keywords: *dill, coriander, mint, drying, microwave, energy, intermittent.*

Development and quality evaluation of gluten-free noodles prepared from modified pea starches and amaranth flour

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Abstract

An increase in celiac consumers has caused an increasing interest to develop good quality gluten free food products. Therefore, the present investigation was undertaken to prepare and characterize the gluten free noodles from native and modified pea starches and their blends with amaranth flour. Noodles were developed using blends of native and modified pea starches (oxidized, annealed and heat-moisture treated) with amaranth flour in the ratio of 1:1. The noodles prepared were analyzed for their cooking, textural and sensory properties. The textural attributes of hardness, adhesiveness, cohesiveness, gumminess and resilience of the cooked noodles were determined using texture analyzer. Blending of amaranth flour with native and modified pea starches had significant effects on the cooking and textural properties of noodles. The noodles prepared from blends with amaranth flour showed less cooking time, low cooking yield and low hardness. Noodles prepared from native pea starch (100%) showed the highest value for hardness whereas the noodles prepared from blend of HMT modified starch and amaranth flour (1:1) showed lowest value for hardness. The noodles with blend of annealed pea starch and amaranth flour (1:1) showed higher value for overall acceptability. It is possible to develop gluten free noodles using blends of modified pea starches with amaranth flour.

Effect of spray drying and freeze drying on physiochemical properties of wine powder

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Abstract

Red wine is made from dark-coloured grape varieties.RedWine powder (powdered wine) is dehydrated red wine. The process of dehydrationremoves the alcohol. However this process leaves behind the flavour and other important components .This review summarises the effect of different drying methods (freeze drying and spray drying) on the physiochemical properties of wine powder ,for eg: pH, Total soluble solid, Titratable acidity, Colour value, Total anthocyanin content, Total phenol content , Antioxidant capacity, Ascorbic acid analysis and Ethanol estimation.Freeze-drying of red wine (with the addition of Maltodextrin) is the most suitable method for drying as it minimizes thermal degradation reactions and removes water and most of the alcohol from red wine. Spray drying of red wine (using maltodextrin) produces red wine powder having low moisture content, high solubility and stable colour. The red wine powder has more benefits than red wine, such as the shelf life of wine powder is more, it has increased health benefits.

Keywords: *Wine powder , Freeze drying , Spray drying , Physiochemical properties of wine powder.*

Himalayan cheese: scientific intervention by exploiting sea buckthorn as a nutraceutical ingredient

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Abstract

The demand for foods containing functional ingredients has increased to a large extent as people prefer foods with health promoting properties.The present study was aimed to prepare *chhurpi*- a traditional Himalayan dried cheese, supplemented with sea buckthorn leaves (SBL) with inherent therapeutic properties. The results of the study revealed that addition of SBL (1.5%, 2.5% and 3.5%) to *chhurpi* significantly ($p < 0.05$) changed its color and texture. The total flavonoids and total phenolic contents of the *chhurpi* samples were also significantly ($p < 0.05$) increased from 0.05-4.63 mg catechin equivalents/g and 7.55-63.04 mg GAE/g, respectively. Enriched *chhurpi* showed significant ($p < 0.05$) increase in anti-obesity, anti-diabetic and anti-proliferative properties. The organoleptic of enriched *chhurpi* samples were modified considerably and gained maximum scoresas compared to control.The FT-IR spectra revealed that intensity of the peaks between 3400-3200 cm^{-1} and 1200-800 cm^{-1} of the enriched *chhurpi* samples increased significantly.

Graft copolymerization of polysaccharides for various potential applications

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Abstract

There is an increasing concern in the use of biomass as low cost and renewable reinforcement for bio composites. Generally, a composite material is made up of reinforcement or filler which is embedded in matrix (polymer). Number of studies has been directed toward the physical and chemical modification of polysaccharides in order to attain new functional material with desirable properties. Graft copolymerization is a useful technique for modifying the properties of the synthetic and natural polymers. Graft copolymerization of vinyl monomers onto polymeric material has advantages of adding properties of the monomer without destroying its own properties. In case of natural cellulosic fibers; graft copolymerization imparts physical, thermal and chemical resistance to the fibers depending upon the monomer used for graft copolymerization.In general, there are three primary grafting methods, i.e., grafting to (polymer-to-polymer grafting), grafting from (monomer -to- polymer grafting), and grafting through (copolymerization). Among these, the grafting-from technique is preferred over other techniques due to faster rates of graftingreactions. The grafted copolymer could be used as reinforcement for green composite. The other potential applications of the grafted cellulosic copolymers are in the fields of controlled drug release, adsorption of harmful, toxic and non-biodegradable dyes from industrial effluents, sorption of heavy metal ions from aqueous medium, modification of electrolyte, electrodes, and separators of the modern Lithium ion batteries, and fabrication of smart and innovative food packaging materials.

Quinoa: a medical marvel

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Abstract

Nowadays, a balanced lifestyle and good diet are emphasized. Fresh foodstuffs are therefore being studied in an attempt to transform the diet and improve the population's health. Pseudo-cereals are a good option as their excellent nutritional and dietary content satisfies the needs of both the food stakeholders and the public. Quinoa (Chenopodium quinoa Wild.) is one such pseudo-cereal that has the ability to contribute significantly to global food security. Quinoa has a high genetic variation, allowing it to conform to a range of demanding conditio ns, including highland and frost. Studies have shown that quinoa seeds have a greater nutrient value than other cereal grains. Quinoa has a large proportion of vitamins (thiamin, vitamin C) and minerals specifically calcium and iron as well as antioxidants mainly polyphenols. Essential amino acids including lysine and methionine are also abundant in quinoa. Quinoa is also gluten-free, making it ideal for patients suffering from various gluten allergies. Quercetin and kaempferol, both present in quinoa, are two flavonoids that have been widely studied. These significant molecules are said to have anti-inflammatory, antiviral, anti-cancer, and anti-depressant properties. Quinoa's soluble fiber content is also quite high. Soluble fiber helps in reducing the blood sugar, cholesterol levels, improve fullness, and aid weight loss. Antioxidants present also aid in the prevention of ageing and other relevant diseases. Thus, the utilization of quinoa as a health food will not only boon the food industry but will also address various health concerns of the population.

Key words:*Pseudo-cereals; anti-inflammatory; anti-cancer; gluten-free, balanced diet; polyphenols*

Varietal comparison of color and mechanical properties of three minor millets

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Abstract

The visual attributes of underutilized minor millets and mechanical properties are involved in wide consumer acceptability since they are correlated to sensory perception. Commonly, instrumental measurements are favored to sensory evaluations because they lessen variations in subjective investigations and may be carried out more rapidly and effortlessly. In this work, physical attributes inclusive of texture properties of three minor millets Barnyard millet (*Echinochloa* spp.), Kodo millet (*Paspalum scrobiculatum*), and Little millet (*Panicum sumatrense*) were studied in order to identify significant varietal differences upon their hulling and size reductions consecutively. Significant differences were found among varieties with respect to technological milling operation profile, relative to CIE L*, a*, b*, and mechanical properties. The principal component analysis showed that the texture profile analysis parameters (hardness, fracturability, resilience, % deformation at hardness) and color properties (whiteness index) were the best indices able to fulfill the aim of this work. Nearly all of the parameters showed differences among different minor millets, validating their importance in the characterization of the variety as well as in the estimation of potential consumer acceptability. In particular, the hardness ranged from 7.02-50.21 N, demonstrated size reduction upon milling decreased grain hardness. The whiteness index analysis may be appropriate to describe varietal differences and their values increased upon subsequent hulling and particle size reduction, ranged from 34.06-69.07. Whole Kodo millet and its hulled grit exhibited the highest hardness and lowest whiteness index respectively.

Keywords: *Minor millets, milling, texture, whiteness Index, sensory.*

Improvement of rancid flavour of ghee by lab fermentation

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Abstract

Ghee is an anhydrous fat rich clarified dairy butter which is prepared from buffalo and/or cow milk.India ranks first in the production of milk with production of about 900,000 tonnes of Ghee are produced in India. Mainly ghee is used as a food additive to impart pleasant taste and smell. Ghee is also used as frying media but it is more expensive in comparison to vegetable oil. During milk powder processing the associated ghee has inferior quality due to its interaction with very high temperature which ultimately results in development of rancidity in ghee and hence the ghee is not utilized for the purpose of consumption. Due to oxidative rancidity in Ghee at the time of its storage lots of Ghee gets spoiled mostly in tropical country like India. As a result of oxidation various quality parameters of ghee are affected such as- Flavour, Aroma, Nutritive Value and Colour, thus its stability for consumption gets affected. Ghee is considered as an expensive and valuable product. At the time of storage the quality of ghee gets affected due to oxidative rancidity. To overcome this problem refining is the only way to make the ghee suitable for the purpose of consumption. Chemical refining of ghee is difficult due to the presence of higher amount of free fatty acids. The fermentation of ghee is done by using the strains of Lactobacillus bacteria which is very useful as it lowers the amount of free fatty acids in appreciable amount which also resulted in improving the overall sensory quality of ghee.

Key Words: *Ghee, Free Fatty Acid, Rancidity*.

Effect of drying methods on quality of amla powder: a review

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Abstract

Indian gooseberry or Amla (*Emblica officinalis*) is a type of small to medium sized deciduous tree, found in different countries India, Pakistan, Uzbekistan, Sri Lanka, South East Asia, China and Malaysia. Amla is highly nutritious and is one of the richest sources of vitamin C. In this study, amla segments were dried under different drying methods namely refractance Window drying, tray drying, sun drying and freeze drying. Amla powder yield varied and significantly affected by drying methods viz sun drying (10.11%), refractance window drying (9.22%), tray dring (7.43%) and freeze drying (2.23%). Total phenolic content was varied from 7.45-19.42 GAE/100g with lowest in sun drying and highest in freeze drying. Freeze dried powder showed the highest content of ascorbic acid (560mg/100g) and tray dried sample showed lowest amount of ascorbic acid (181.15mg/ 100g). Highest solubility index was observed in freeze dried sample and lowest was in tray dried sample. Among all dried powder samples, the freeze-dried sample was lighter in color and has highest sensory score.

Keywords:*Amla fruit, Amla Powder, Hot air oven drying, Sun drying, freeze drying, Refractance window drying.*

Optimization of extraction parameters of total phenolic compounds and total anthocyanin content by supercritical fluid extraction (SCFE) from tamarillo

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Abstract

The study intends to optimize the extraction process parameters for purple tamarillo using supercritical fluid and ultrasound-assisted extraction techniques. Optimizations of extraction conditions were done using response surface methodology in which Box-Behnken design of 3 independent variables and 2 dependent variables were employed. The experimental range for independent variables in SCFE was the time (30-60 min), temperature (40-60°C) and pressure (150-180 Bar). Among 4 models, a quadratic model was found to be significant possess high R^2 value and low p-value for TPC and TMAC in both extraction techniques. The optimized conditions for SCFE were 49.42 min, 49.28°C and 176.63 bar of pressure in which maximum phenolic and anthocyanin content was found and results were correlated after observing SEM images of optimized samples with the control sample.

Keywords:*Optimization, Tamarillo, Box-Behnken design, Supercritical fluid extraction, SEM, HPLC*

Phenomenological kinetic modelling of conventional and ultrasound-extraction of carotenoids from passion fruit peel using green solvent

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Abstract

The aim of this study was to understand the phenomena of extraction of carotenoids from passion fruit peel that is discarded as waste, using sunflower oil at different temperatures during ultrasonic treatment. This study indicated that ultrasound-assisted extraction (UAE) was effective for extracting the carotenoids and gave better carotenoids extraction rate at lower extraction temperature while conventional extraction required higher temperature. A phenomenological model was used for modelling the kinetics of the extraction process, in which it was assumed that UAE extraction process comprises of two stages, in the first stage rapid penetration of oil into solid by washing process, followed by second stage slow mass transfer by diffusion process and both occur simultaneously from the beginning. For this model, the washing constant parameter (k_1) was found in the range of $78.300\times 10^{-2} to\ 78.356 \times 10^{-2}$for UAE and $50.543 \times 10^{-3} to\ 62.214 \times 10^{-3}$for conventional extraction process. Similarly diffusion constant (k_2) was obtained in the range of $59.62 \times 10^{-4} to\ 10.155 \times 10^{-3}$and $46.19 \times 10^{-4} to\ 80.62 \times 10^{-4}$, respectively for UAE and conventional extraction process, which implies that UAE has higher extraction efficiency than conventional method. For all extraction processes, $k_1 > k_2$, implying that washing stage was more predominant than diffusion stage, and ultrasound influences only the first stage. The pseudo-first order model and instantaneous washing followed by diffusion model had small R^2 value and relatively high mean relative percent deviation (MRPD %) values as compared to phenomenological model for the adopted extraction technique. The above results indicated that the phenomenological model better described the variation of carotenoids yield with time than the simpler models and could be recommended for modelling the extraction kinetics and it is suitable to understand the phenomenon.

Keywords:*Ultrasound assisted extraction (UAE), Phenomenological model, kinetics parameters, carotenoids, passion fruit peel*

Mineral content and antimicrobial activity of lactic acid against *Bacillus cereus* and *Listeria monocytogene and* of defatted coconut milk and pineapple juice beverage

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Abstract

The aim of this study was to examine the mineral content of defatted coconut milk and pineapple juice beverage and bactericidal effect of lactic acid, against *Bacillus cereus*and *Listeria monocytogene*in blendedbeverage. The results showed that out of seven analysed minerals potassium is present in abundance in blended beverage (415.42 mg/L) compared with other six minerals. Mg is the second abundant mineral 72.70mg/L, Ca is the third preponderant mineral in blended beverage i.e., 52.20mg/L and sodium is the fourth prominent (27.89 mg/L). Some trace elements (e.g., Fe, Zn and Mn) Fe and Mn are present in lower amount (2.14mg/L and 3.52mg/L) compared with Zn i.e., 10.74mg/L. Logarithms of published D-values of pathogens were plotted against temperatures (°C) to recalculate the pasteurization parameters for blended beverage. The blended beverage was inoculated with bacterial strains were harvested from stock culture in the Luria Bertani (LB) broth at 37 ± 1°C for 18 ± 1h. The blended beverage was treated with lactic acid along with different time (5-120 sec) and temperature (60-90ºC) combinations. The D value for 60, 70, 80 and 90 ^{0}C for without lactic acid were 62.18, 45.24, 42.55 and 28.81s respectively. Similarly, for with 1% lactic acid were 42.02, 38.47, 33.33 and 27.32s respectively.

Keyword:*Mineral content, antimicrobial activity, defatted coconut milk, pineapple juice, blended beverage*.

Optimization of encapsulation of phytocompounds of Dragon fruit (Hylocereus undatus) peel

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Abstract

Dragon fruit (Hylocereus undatus) peel is the major by-product of the fruit and the peels are rich sources of phenolic compounds and nitrogen comprising pigment betacyanin. Ultrasound-assisted extraction method (UAE) was applied to extract phytocompounds from dragon fruit peel at ultrasonic temperature of 60 °C, solvent to solid ratio 25:1 mL/g, ethanol concentration 60%, and ultrasonic treatment time of 20 min. The extracted phytochemicals were encapsulated in an encapsulator (buchi B-390) using calcium chloride (0.5M) and sodium alginate as wall materials. The extracted phytochemicals from dragon fruit peel were mixed with sodium alginate in the ratio of 1:1. Face-centered cube central composite design was used for modelling and optimization of the encapsulation process. The effect of three independent parameters namely encapsulator vibration frequency (500-1000 Hz), sodium alginate concentration (0.5-1.5%) and flow rate (8-12 ml/min) were studied on the response encapsulation efficiency (%). The encapsulation efficiency was found to be in the range of 35.51 to 81.69 % at different combinations of process parameters. Vibration frequency found to have positive effect whereas the other two process parameters sodium alginate concentration and flow rate found to have negative effecton the encapsulation efficiency. Maximum encapsulation efficiency of 84.07% was obtained at optimized condition of vibration frequency of 880.44 Hz, sodium alginate of 0.5% and flow rate of 9.47 ml/min.

Keywords: *Dragon fruit, encapsulation, betacyanin, calcium chloride, sodium alginate*

Role of high pressure processing technology in fruits

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Abstract

High pressure processing (HPP), also known as high hydrostatic pressure (HHP) is a modern method of food presservation used commercially in many countries. It relies on the application of very high pressures (up to 600Mpa) to the food/beverage to inactivate microorganisms. Since no heat or mild heat is applied, most of the original food sensory, nutritional and functional properties are retained after processing, and fresh fruit like products with longer shelf-life are produced. HPP treated fruit products are cold stored, and therefore mould can be an issue as they grow at temperature as low as 10C. Transmittance of pressure is uniform and instantaneous which makes the HPP independent to the size and geometry of sample and shortens the processing time. The effect of HPP on food chemistry and microbiology is governed by Le Chatelier's principle. HPP stimulates phenomenon like phase transition, chemical reactivity, change in molecular configuration. HPP can disrupt large molecules of microbial cell structures, such as enzymes, lipids, protein and cell membranes, and leave small molecules such as vitamins and flavour components unaffected. HPP can also inactivate protease inhibitors such as phytate and increase in vitro protein digestibility (IVPD) of legumes. HPP is an emerging non thermal technology improving the quality retention and shelf-life of the products.

Key Words: *High hydrostatic pressure, non-covalent, transmittance of pressure, phase transition, chemical reactivity, in vitro protene digestibility (IVPD).*

Recent trends in the application of cold plasma in foods

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Abstract

Cold plasma technology is gaining fame for its unique characteristics like treatment in low or ambient temperature for a short period of time which helps in retaining the integrity and quality of food products. Cold plasma has proved to be efficient in sanitizing equipment for inactivating the food borne pathogens from fresh produce and packaging materials. It also helps in catalyzing certain manufacturing processes, acts as an active packaging and retards the browning reaction in foods. Plasma sterilization provides high efficiency, preservation and does not introduce toxicity to the medium. Cold plasma is generated at atmospheric pressure, by passing a process gas through an electric field. The most important is to select a particular gas, which already possess germicidal properties so that the efficiency of plasma sterilization can be increased. Electron arising from ionizing processes, accelerated in the field , trigger impact ionization processes. Free electron colliding with gas atoms transfer their energy, thus generating highly reactive species that can interact with the food surface. The electron energy is sufficient to dissociate covalent bonds in organic molecules. Thus a cold plasma is a promoting technique for food processing in near future .cold plasma is an emerging, economical and environment - friendly technology with potential applications in food and bio processing industry, including microbial decontamination, enzyme inactivation, shelf-life extension, and physio-chemical modification.

Keywords:*Plasma, Novel technology, Food processing, Micro-organisms, Packaging.*

Pulsed electric field processing: an emerging technology for food preservation

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Abstract

Preservation of food is highly imperative to ensure the safety, prevent spoilage, extend shelf life, enhance keeping quality, control the food poisoning and reduce economic loss. Pulsed electric field is one of the emerging techniques to preserve the foods, especially the liquids such as milk, yoghurt, juices, soups, rice pudding, and liquid eggs. It has the potential to produce the foods with desirable sensory and nutritional quality characteristics besides extends shelf life and ensures safety. Pulsed electric field uses short electric pulses to preserve the foods and is considered suitable for the pasteurization of heat sensitive foods. The basic principle of pulsed electric field is the application of short pulses of high electric fields with duration of micro seconds and intensity of 10-80 kV/cm. The processing time is calculated by multiplying the number of pulses with effective pulse duration. Use of high voltage results in electric field that causes the inactivation of organisms. When an electric field is applied electric current flows into the liquid food and is transferred to each point in the liquid because of charged molecule present. Many applications of PEF have been investigated in food applications as well as in various biotechnological interventions and reflected its impact on biological cell membranes. PEF is also applied to enhance extraction of sugars and other cellular content from plant cells such as sugar beets. PEF could be utilized as one of the most advanced techniques for preserving the quality attributes and enhancing the shelf stability of various liquid foods.

Key words: *Emerging technology; Foods; preservation; Pulsed electric field; Milk; yoghurt, shelf stability*

Quality evaluation of cakes as affected by the replacement of sohphlang (*Flemingiavestita*) flour in the formulation

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Abstract

Preparation and evaluation of cake supplemented with sohphlang flour was carried out with the goals to replace wheat flour by sohphlang flour at varying levels (0-100%) and to evaluate the physico-chemical, anti-oxidant, textural and sensory properties of cakes. Storage modulus (G') and loss modulus (G") of cake batters were higher as the addition of sohphlang flour increased. As sohphlang flour proportions increased, protein content and fat content decreased significantly. Moisture content and fibre increased as more sohphlang flour was introduced to cakes. Results of colour properties showed that crumb colour of cakes decreased significantly with the increasing levels of sohphlang flour. Weight loss and volume index of cakes decreased as the proportion of sohphlang flour increased. A significant increase in total phenolic content (TPC), total flavonoid content (TFC), radical scavenging activity (RSA), metal chelating capacity (MCC) and reducing power (RP) was observed in cakes produced from cake batters containing higher levels of sohphlang flour (10-100%). Increasing in sohphlang flour proportions led to a markedly decrease in hardness of cakes however, the effects on adhesiveness, cohesiveness and springiness followed an irregular trend. Sensory evaluation (crust colour, crumb colour, crumb texture, taste, aroma and overall acceptance) revealed that 20% replacement of wheat flour by sohphlang flour was found to be the most acceptable formulation in cake making. Thus, cakes containing sohphlang flour can enhance the utilization of sohphlangin food systems and may be considered as possible health-beneficial foods because of an increased anti-oxidant activities.

Keywords: *Sohphlang flour, replacement, physico-chemical, anti-oxidant, texture, sensory*

Emerging technologies in fruit by-products valorization: An overview

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Abstract

Among the horticulture crops, fruits are the mst utilized commodities. Processed, minimally processed, and raw forms are consumed because of their nutrients and bioactive compounds. Increased population has significantly increased the demand for the production and processing of fruits and their products. This over-production by processing industries leads to the production of a large amount of waste and by-products, which has created serious economic, environmental, and economic issues. To overcome these issues a focus has shifted for the development of novel emerging techniques for the utilization of waste and by-products have gained interest of food researchers in past few decades. The peels, unused flesh, seeds, pomace, and albedo are the major by-product, rich in many valuable compounds. These compounds are used by many industries as economical, low-cost, and natural sources of antioxidants, dietary fiber, enzymes, pectin, organic acids essential oils, food additives, etc. This paper aims to highlight the utilization of by-products from various fruits.

Keyword: *Fruit by-product; Valorizations; Bio-active compounds; Extraction techniques*

Comparative study of physico-chemical, functional, and anti-oxidant properties of native and roasted rice (*Oryzasativa* L.) flours

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Abstract

The present study was aimed to evaluate the physico-chemical, functional, and antioxidant properties of native, roasted and soaked prior to roasting rice flour (*Satu*). On the basis of results, it was observed that on roasting moisture content reduced significantly ($p \leq 0.05$) from (11.92% - 5.20% and (11.36% - 5.03%) for K-39 and SR-1, respectively while as ash content showed significant ($p \leq 0.05$) increase from (0.55% – 0.61%) and (0.38% - 0.40%). However, fat content remained unaffected on roasting. The results showed that peak, trough, final, setback and breakdown viscosities were significantly ($p \leq 0.05$) reduced, whereas the pasting temperature increased following roasting. Water and oil absorption also shows significant ($p \leq 0.05$) increase. From the study it is clear that Rice flour has good TPC and antioxidant (DPPH, FRAP) activities which increase significantly ($p \leq 0.05$) with roasting.

Keywords: *Rice; flour; roasting; physicochemical; functional; pasting and antioxidant properties.*

Extraction of mango kernel butter from mango seedkernel using different extraction methods

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Abstract

Therapid industrialization and generation of huge quantity of agro-food waste necessitates the need to convert this waste into value added products. Mango is one of the major tropical fruit cultivated in India as the country constitutes about 40% of the global mango production. The mango seed kernel constitutes 20 to 60% of the entire fruit weight and so this by-product can be valorized by extraction of various high value compounds, one of them being the mango kernel butter. Mango kernel fat which is free of any trans-fat and possesses antioxidant activity can be extracted from this by-product generated which otherwise is a menace to the environment. It can be extracted using various techniques including maceration, soxhlet and super critical fluid extraction. The high phenolic content of mango kernel fat slows down induction period thus leading to its increased oxidative stability. This property can be used to increase the oxidative stability of other vegetable oils by blending of mango kernel fat. Owing to its high nutritional potential, the extracted mango kernel fat can be utilized in various application segments like in chocolate, bakery and oil industries for its incorporation in a variety of food products thus serving as an acceptable nutraceutical product with health enhancing properties.

Keywords: *Mango kernel butter, extraction, by-products, valorization*

Water purification by bio-adsorbent: a review

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Abstract

Many processes are available to purify water i.e., precipitation, reverse osmosis, reduction but all of them are expensive which makes them not suitable for small scale industries. In this review, tried to discuss on water filtration unit using bio absorbent, which is low in expense and help to solve the potable water problem. Different bio-absorbent may be obtained by agro-waste produce by local fruit juice vendors or fruit and vegetable industry i.e., pomegranate peel, banana peel, orange peel and coconut husk. These bio-absorbent are inexpensive, easy and safer to use. These bio adsorbent materials contain mainly polysaccharides, proteins, and lipids, functional groups that act to bind metal ions such as carboxyl, hydroxyl, sulphate, phosphate, and amino group. These bio-adsorbent are used to remove phenol, copper, lead, dye from water with relation to temperature, contact time, pH of the solution by using physical absorption process. This process can be used for low cost waste water treatment due to the abundant and cheap availability of bio absorbent.

Keyword:*Filtration unit, Bio absorbent, Agro-waste, Physicochemical properties of water*

Effect of different drying method on protein enriched fruit bar: a review

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Abstract

Fruits and vegetables are important component in healthy and balanced diet as they are rich in vitamins, minerals,fiberandantioxidants which are health promoting components**.**Today's foods are not only limited to satisfy hunger and provide basic nutrition for human but also help as functional diet for preventing nutrient related diseases and impact a positive effect on physical as well as mental well being of the people.Consumer are nowadays getting more aware about the effect of food on health and therefore demand for functional and healthier foods product incorporating fruit and vegetables with functional ingredient like protein are significantly increasing in the market segment.Therefore fruit leather is considered a preferableconfectionary product which is dehydrated and stable product prepared by blend of fruit pulp or purees from fully ripe fruits . Present review was planned to discussed on the development of protein enrich fruit bar and their effect on different drying method such as hot air drying, freeze drying and Refractance window drying to study its physicochemical properties.The bar can be consumed as snack food for having antioxidant and protein content which may improve health and prevent lifestyle diseases.

Keywords:*Fruit bar, Refractance window drying*

Valorization of potato peel in food processing: a review

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Abstract

Potato (*Solanum tuberosum*) is one amongst the most consumed crop by Indian people and its production rate is also high all over the world each year. The waste derived from potato i.e. peel is a no value product, and is produced in high amount by each of the food processing industry which is 15 to 40% of the initial product mass. Utilization of waste can be a very positive approach towards products from no value to useful without being so costly and is also a major concern to be dealt with. This review summarizes the utilization of potato peel i.e. waste as a substitute for the antioxidant activity as it is rich in the phenolic content, as well as it can be used as one of the replacement in the dough making in fermentation industry because of its sensory properties. Potato peel is rich in the bioactive compounds thus, making the value added goods. The valorisation makes it useful as an adsorbents, bio composites and packaging materials.

Keywords: *Potato, potato peel, value added goods, bioactive compounds and valorisation*

Application of nanotechnology in food processing

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Abstract

Nanotechnology is one of the emerging smart techniques in food science and technology. In order to produce fresh convenient and flavourful food products, nanotechnology has provided a broad range of application in food processing, packaging and pharmaceutical sector. During processing, nanoparticles are added to food in order to improve colour and stability. Nanoparticle (nano clay) has been also incorporated in food packaging materials in order to prevent food spoilage, enhance the film barrier, mechanical properties and stability of film. Nanoclay prevents oxygen transfer and product destabilization. They also provide UV stability. As advancements in nanotechnology continue as a harbinger of change, its accessibility in the food industries is sure to increase. With the use of this technology, food producers and manufacturers could make a greater step towards food safety. In addition to the technical and scientific advancement to food, the regulatory considerations, economics and consumer acceptance of the nanotechnology will ultimately direct its contributions in food applications.

Keywords: *Nanoclay, nanoparticle, food processing*

Effect of different methods on the extraction of protein isolate from soyabean meal

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Abstract

Soyabean meal as an industrial byproduct is mostly used for animal feed. Hence the value addition of this byproduct, specifically for food product formulation is highly important as it constitute around 45% of protein. The present work was aimed to evaluate the effect of extraction methods on the yield of protein isolate prepared from soyabean meal. The preparation of soyabean meal protein isolate was conducted using different methods like isoelectric precipitation method by varying pH (8-11), alkali extraction acid precipitation method, maceration method, dialysis method etc. Protein isolate prepared with isoelectric precipitation method at extraction pH 8 showed the highest purity of around 90% than that prepared with other extraction methods. Whereas, protein isolate prepared with alkali extraction acid precipitation method showed the highest yield of around 18% among the other protein isolate prepared with various extraction methods. Functional properties like particle size, solubility, foaming characteristics of protein isolate prepared with isoelectric precipitation method at extraction pH 8 and 9 was higher as compared to other protein isolate prepared with various extraction methods. The overall study suggested that isoelectric precipitation method can be better method for the preparation of protein isolate from soyabean meal.

Keywords: *Soyameal protein isolate, protein purity, functional property, extraction pH.*

Comparative evaluation of various extraction techniques for isolation of polyphenols from kinnow mandarin peels

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Abstract

Kinnow mandarin (*Citrus reticulata*) is a citrus crop producing loads of by-products. These by-products are profuse in functional compounds mainly polyphenols, and hold a tremendous potential to be utilized in food and pharmaceutical industry as economical source of nutrition Polyphenols (phenolic acids and flavonoids) act as free radical scavenging and chelation agents and are known to exhibit various therapeutic effects against cancer, diabetes, and cardiovascular diseases. In the present study, different extraction solvents (acetonitrile, ethanol, methanol, hexane, ethyl-acetate and water) were chosen on the basis of their polarity for the extraction process. Various extraction techniques employed were maceration, solvent extraction, and bath sonication. The objective of the study was to screen a technique and solvent providing maximum polyphenols. From the experimental data, it was noted that the total phenolic content values were maximum for methanolic extract and minimum for hexane extracts. Total phenolic content of 29.538, 27.884 and 31.64 mg GAE/g extract were observed inSoxhlet, maceration and bath sonication extraction of kinnow peels respectively. In the ethanol extracts, phenolic content increased from 24.630 to 26.295 mg GAE/g extract when extraction method was shifted from maceration to Soxhlet extraction, and on using bath sonication, phenolic content increased to 27.54 mg GAE/g extract.

Keywords: *Kinnow mandarin, By-Products, Bioactive compounds, Extraction, Total Phenolic Content*

Challenges and opportunities in converting food waste to watts

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Abstract

Industrial and Municipal food waste are becoming a matter of concern in order to attain sustainable development goals. In this context, MFC could emerge as a boon for harnessing values from waste. Being a green and sustainable technology, it can easily induct and complement future economic growth. MFC converts biochemical energy into electricity, which is mediated through complex metabolic process. However, the power output from MFC is less due to various factors but MFC do possess great potential for application in low powered devices. With advent in researches towards its up scaling has open gateway for it to be future technology; however the technical interventions need to be addressed. Though researchers have explored this novel technique up to some extent but there is a long way to go. The complexity of this technique is high, precise understanding is required for its commercialization. Therefore, this article aims to present how MFC has potentially utilized the food waste as substrate for electricity generation and treatment of food waste. Further, challenges like cost of electrode, PEM membrane material, low power density, membrane fouling, pH imbalance, electron losses, and probable solutions for same in commercialization of MFC have been presented.

Key words*: Microbial fuel cell, Challenges, Solution, Food waste, Environment*

Overcoming the deterioration of retorted traditional meat products of Kashmir by use of gums.

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Abstract

The addition of gums to restructured meat products like goashtaba was conducted to study the effect of varying concentrations of different gums and their mixtures on instrumental color, texture, lipid oxidation, sensory and microbiological properties of retorted goshtaba after four months of storage period at ambient temperature. Color evaluation indicated that formulations incorporated with gums retained color during storage compared to the control product. The significant ($p < 0.05$) increase of TBARS values of control reflect the more oxidative degradation of lipids than treatments incorporated with gums and their mixtures. The texture of goshtaba product is very important quality attribute as per acceptability of consumer is concerned. Loss of texture during storage makes the product less acceptable and decreases the product potential. The results indicated that at end of storage period formulations with gums and their mixtures retained more textural attributes. Sensory evaluation indicated that formulations with varying levels of different gums and their mixtures resulted higher firmness, flavour intensity, juciness and overall palatability scores compared to the control goshtaba product. Absence of microbial count (TPC) indicated that retorting at 121ºC at 24 psi for 50m was sufficient to provide microbial stability of product.

Key words: *Retorting, Goshtaba, Texture, color, lipid oxidation*.

Antioxidative potential of spent hen meat hydrolysate

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Abstract

When layer hen loose its ability to lay eggs, they become waste to poultry industry because even meat from such henbecomes unsuitable for consumption from a sensorial perspective due to its very tough texture as collagen tissue increases as age progresses. These hens are often termed as spent hens. Production of bioactive peptides with better functional and nutritional characteristics could be one of the better ways to utilize spent hen meat effectively.In this study, the effect of enzymatic hydrolysis onantioxidative potential of spent hen meat has been investigated using Alcalase® (1%) and Flavourzyme® (1%) in simultaneous and sequential mode at temperature and pH of50°C/7.5 and 55°C/6.5 respectively. Degree of hydrolysis and antioxidant activity using 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical assaywas analysed for a period of 6 h. Infrared spectroscopy was also done to determine the changes in the functional groups during the course ofhydrolysis. Sample retrievedat180 min showed highest scavenging activityof 91.52 ± 0.04 % through sequential mode. Increase in antioxidant power can be due to the formation of low-molecular weight fraction of peptides which showed bioactivity. Subtle decrease in antioxidant activity after3 h was observed. It can be clearly inferred from the results that hydrolysis time of 3 h was suitable for producing peptides withhighest antioxidant power through sequential mode. Spent hen meat hydrolysate can be converted into powder which will find application as nutraceutical in functional food market.

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Abstract

The aim of this paper is to discuss the principal issues related to water quality and quantity in food production and more about the sewage treatment methods in Food Processing Industries. Primary production to transformation (factory/industrial processing) is covered. Retail and catering issues will not be discussed. The paper is not intended to be a comprehensive review of all information but will focus on recent developments and future perspectives.

Food producers have been legitimately adding water to food since processing of food began. There are also many examples of water as a processing aid including use as a thermal transfer medium, as a transport medium and in cleaning. Currently food companies are putting much effort into reducing water consumption during transformation and significant savings can be made. There are five ways of reducing water consumption in food processing premises: reduction in uncontrolled use, improved planning and control, water reuse, water recycling after treatment, layout design improvements. Typically, water consumption can be reduced by up to 30% by simple cultural and operational changes with little capital investment. Examples include awareness and monitoring programmes and taps that automatically shut-off when not in-use. Similar savings are also possible with reuse, recycling and design improvement programmes however capital investment is higher and greater consideration needs to be given to the impact of the changes on finished products quality and safety. Water use can also be made more efficient by adapting the water quality to the crop. Secker (1996) cites an example where salty drainage water from one crop is used to irrigate cotton, which is salt-tolerant. The highly salty drainage water from the cotton is used to irrigate halophytes (extremely salt tolerant plants).

Assessment of Nutritional composition, acceptability, and shelf life stability of cookies fortified with pearl millet and oat flour

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Abstract

Refined wheat flour, a key ingredient in the cookie is mainly composed of starch which is devoid of nutrients particularly minerals. This study determines the possibility of using two different flours pearl millet and oat flour as a replacement for refined wheat flour in cookie preparation. In the present investigation, efforts have been made to prepare and evaluate the cookies by using the blend of pearl millet flour, oat flour with refined wheat flour. Pearl millet and oat itself are nutrient-rich. The quantitative descriptive analysis method adopted to assess the sensory quality of the cookies the study revealed the good quality and sensory acceptability of cookies of pearl millet flour, oat flour, and refined flour with a ratio of 30:30:40. Proximate composition revealed that pearl millet cookies and oat cookies had higher protein, ash and dietary fiber compared to control. Physical characteristics of cookies showed that with the diameter of control, cookies did not vary markedly. Besides, the crisp and crumbly texture perceived in these cookies further enhanced their sensory appeal making them highly palatable. Further, the prepared cookies were studied for storage in an air-tight container and low-density polyethylene, and the effect of packaging and storage on the physicochemical qualities of the cookies was studied for 40 days. The sensory evaluation results indicated that cookies stored in the air-tight container were found to be highly acceptable compared to LDPE. This study indicates the prospects for utilization of pearl millet or oat flour in preparing cookies with enhanced nutritional quality and sensory attributes.

Keywords: *Pearl millet, oats, cookies, sensory attributes, dietary fiber*

Ultrasound-assisted osmo-convectively dehydrated papaya slices: effect on quality & sensory attributes

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Abstract

In this study, ultrasound-assisted osmotic dehydration (UAOD) pretreatment in combination with hot-air drying has been applied on papaya slices. UAOD technology is a suitable process by which we can reduce the water content of foods without subjecting them to high temperatures.Papaya slices were osmotically dehydrated at different sugar concentration (45°B, 55°B and 65°B) followed by hot air drying at different temperatures (45°C, 55°C and 65°C) and the effect on quality and sensory characteristics was studied. Mature papaya of eating quality were peeled and cut into slices of dimensions 30 mm × 30 mm and thickness 10 mm, after being treated with 2% KMS solution to maintain the color and firmness of the papaya the effect on quality & sensory characteristics was studied and papaya slices were sonicated in ultrasonic bath sonicator for 10 min. 200 g sliced papaya was dipped in sugar solutions of different concentrations containing 2% weight by volume of each, citric acid and calcium chloride. The ratio of weight of fruit to volume of syrup was maintained at 1:4. The sugar solution containing the sliced papaya was placed on shaker for 2 hours and then refrigerated overnight. The papaya slices were removed from sugar solution, rinsed in distilled water and dried in tray drier at 45°C, 55°C and 65°C for 5 hours. The effect of drying conditions on different quality attributes of papaya slices depicted that the final moisture content of samples decreased with increase in air temperature and sugar concentration. The samples subjected to 65°B sugar solution and 65°C drying air temperature showed highest sensory score and was liked the most.

Keywords: *Ultrasound-assisted osmotic dehydration, osmo-convective dehydration, sonication, fruit drying*

Advanced drying machine for making of mango leather

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Abstract

Mango is considered as the king of fruit as it is very delicious and utilized in many ways. Mango Leather or Mango Papad is one of the traditional food made from ripped mango pulp which is a very popular snack all over India as well as outside. Although the preparation of mango leather is mainly confined to manual processes in the traditional way, few machines are now available for washing and cutting mangoes, making pulp, pouring, and making the layer of pulp. But the process of drying of pulp is still in open air exposed to sunlight. This has many drawbacks including the unhygienic in practice, very weather dependant, time-consuming and unreliable process. An oven-drying mango leather making process is also sometimes preferred but it's costly and required high human attention. Therefore, an advanced device has been proposed here with a semiautomatic drying process for drying the mango pulp to address the drawbacks of traditional drying practice. The device combines the sun drying process with electric heating technics to ensure reliable and speedy production nominalizing the dependency on weather maintaining a high level of hygiene. Its inbuilt sensory system will guide the drying process to minimize the human attention required. The solution is very cost-effective, user-friendly, and can be customized as per the user's requirement.

Keywords: *Mango leather, Mango papad, Pulp drying process, Semiautomatic drying process*

Influence of chemical preservatives on preservation of jamun pulp in deep freezer

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Abstract

An attempt was made to preserve the jamun pulp in deep freezer for a period of three months.The results revealed thatduring storage period of 90 days, results of the pooled mean of treatment T_3 (Sodium Benzoate 500 ppm) on Jamun pulp revealed that, increase in TSS (14.77 $^{\circ}$B to 14.97 $^{\circ}$B), titratable acidity(1.16 to 1.26), reducing sugar (10.82 to 11.76 %), total sugars (12.39 to 14.38 %) and decrease in ascorbic acid (43.51 to 31.69 mg/100g), anthocyanin content (183.92 to 179.93 mg/100g), phenol content (181.17 to 174.22 mg/100g) and total antioxidant activity (89.66 to 81.20 %), respectively during the storage period of 90 days. Organoleptic scores decreased from an initial value of 8.92 to 8.53 for colour and appearance, 8.65 to 7.99 for taste and flavour and 8.45 to 8.34 for overall acceptability. The results of organoleptic evaluation particularly indicated that the treatment T_3 (Sodium Benzoate 500 ppm) found superior with respect to acceptability than other treatments for all the sensory parameters like colour and appearance, taste and flavor and overall acceptability throughout the course of investigation. There was marginal increase in microbial load (TBC) in jamun pulp during storage (1.89 to 2.06 CFU/g), but it did not affect the wholesomeness of the product up to 90 days of storage.

Applications of high electric field pulse treatment in food processing and preservation: a novel and emerging technology

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Abstract

In recent times some of the non-thermal processing technologies have come up as an alternative for pasteurization and sterilization process. In food preservation and processing industry, various thermal treatments may lead to several undesirable changes in quality attributes and nutritional value of food whereas non-thermal preservation methods have minimal impact and modify the functional properties of food without substantially increasing the product temperature. High electric field pulse treatment (HEFP) or Pulsed electric field (PEF) is an emerging non-thermal method of food preservation in which a food product is placed between two electrodes and exposed to pulse high voltage(s) with duration of micro to milliseconds for microbial inactivation and minimizes undesirable changes on food quality attributes. PEF technology focuses on providing consumers high-quality food that remains in its raw natural state, without viable contaminating organisms. In this regard, PEF technology acts as a better alternative for various food products, particularly for liquid foods for better preservation and maintenance of fresh-like quality aspects. However, PEF is not capable of achieving commercial sterility because of the presence of spores or other non-public health-significant microorganisms. Thus, other preservation techniques, such as refrigeration, atmosphere modification, the addition of preservatives, or a combination of these techniques, will be required to preserve the quality and stability of the food. Its mechanism, approaches, effects of this treatment on food quality, consumer acceptance will also be discussed in this study.

Keywords: *Pulsed electric field, Non-thermal preservation, food quality, microbial inactivation*

Recent advances in non-thermal processing of food

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Abstract

The concern of consumers is increasing continuously towards safe and nutritious food which is free from chemical food additives. Thermal processing techniques such as pasteurization, canning, and ultra-high temperature can ensure microbial safety of foods but these results in the destruction of heat-labile nutrients as well as the alteration in organoleptic characteristics of food. The use of chemical food additives such as synthetic colors, flavors, and preservatives has been increasing continuously to enhance the sensory characteristics as well as for controlling spoilage and pathogenic microorganisms. But these have been found to cause long-term negative effects on human health. Therefore consumers are avoiding such types of foods resulting in the decreased sale of such products and affecting the future income of the food industry. Keeping in view the deleterious effects of thermal techniques on nutritive value, many food manufacturers are exploring the application of non-thermal techniques in food processing. These non-thermal techniques involve processing at low temperature for shorter periods and help in retaining the nutritional components and keeping the sensory characteristics such as color, flavor, taste, etc. almost similar to that of raw materials. These techniques involve the use of UV-light, pulsed electric fields, ionizing radiation, oscillating magnetic fields, membrane separation processes, high hydrostatic pressure, and ultrasound for non-thermal processing of food. These techniques meet the requirements of minimally processed foods for consumers and have been widely used for cold pasteurization, concentration, extraction, etc. These techniques have emerged as industrially approved methods for minimal processing of food and enabling them to get preserved for longer periods without much deterioration in nutritional and sensory characteristics.

Keywords: *Non-thermal processing, shelf-life, ultrasounds, high hydrostatic pressure, pasteurization.*

Determination of a suitable thin-layer drying for fruits and vegetables: a review

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Abstract

Drying has been indispensible part of food processing operations. It has been practiced since time immemorial. It has more positive impacts rather than negative ones. Occasionally, it has been observed that drying may reduce or destroy the volatile nutrients of the food but in contrary it provides longer shelf life by concentrating the other essential nutrients, reduce bulkiness/ weight and hence reduce the freight charge, and many more to count so on. Various technology and methods has been evolved to modify or ease out the complexity of drying kinetics. Hence mathematical modeling played a vital role in determining the efficiency of the technique of drying method. In this review paper various mathematical modeling related to thin layer drying has been discussed concentrating on fruits and vegetables popularly grown in north-eastern part of India. It will provide clear cut idea of use of mathematical modeling during drying and help researcher in designing the experiment of drying technology of fruits and vegetables.

Keywords:*Volatile, Nutrients, Thin-layer Drying, Mathematical modeling, Designing Experiments, Fruits and Vegetables.*

Innovative studies on thermal processing of analogue shrimp products from lizard fish in retort pouches

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Abstract

An attempt was made to explore the possibilities of better utilization of lizard fish (*Saurida tumbil*) for the development of valuable analogue shrimp products. The aluminium and polylactic acid shrimp moulds were developed and to produce the analogue shrimp products. Thermal processing of restructured products in retort pouches such as fish ball in curry medium, surimi stew in white tripod, boneless rohu balls in curry. Also no work had done on thermal processing of shrimp analogue products in retort pouches. The main objective of this work was to develop the analogue shrimp product from lizardfish and to compare the heat penetration attributes of analogue shrimp curry and masala using retort pouches and different sterilization methods such as steam / air over pressure retort and water immersion retort.

Keywords: *retort pouch, water immersion, over pressure retort, analogue shrimp product*

High-pressure processing

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Abstract

Food spoilage is a major problem and concern of food industry. Microbial contamination, infestation by insects or degradation by endogenous enzymes are mainly responsible for this kind of spoilage which causes food to be undesirable and unhealthy for human consumption. Thermal treatment can be used to inactivate such food spoiling microbes or enzymes and extend its shelf life. However, food contain many heat sensitive nutrients and use of thermal treatment on food may cause a change in its sensory and nutritional aspects such as loss of flavor, color, freshness etc. High pressure processing is a non-thermal technology having the capability to be a suitable substitute for thermal processing technology. Food are subjected to high hydrostatic pressure up to 1000 MPa for a specified time period. It produces product with minimal change in its sensory and nutritional properties retaining its fresh quality and higher nutritive value.

Essential prerequisites of food production and availability for food security, safety and sustainability without associated ecological harm-a case study in central India

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Abstract

Nutrition based food production and its availability has become a great challenged and important concern for 21st century due to rapidly increasing population, over doses of fertilizers/chemicals and diminishing per capita arable land and irrigation water resources. Agriculture/Food production provides the base for food security as it is a key determination of food availability. Over 60 percent of the Indian population continue to depend on agriculture and allied activities for their livelihood but due to lack of natural resources viz. water etc., ensuring adequate food availability has become very tough. A study of GKD watershed located in Bundelkhand region of Central India reveals about different prerequisites planning, adoptive technology and cultural system in different aspects of ensuring high productivity and production without associated ecological harm for ensuring food security, safety and sustainability. Since, land is a shrinking resource for agriculture, the essential prerequisites pathway should be higher productivity per unit of arable land and irrigation water. In India fortunately, most of the farmers almost 80% belong to small and marginal category and in such conditions, water management strategy, small farming, government policy, category of seeds, agronomic management of forage crops, scientific cultivation, adoption of silvi-pastoral system, adoption of agri-silvipastoral system, agri-horti-silvicultural system and horti-pastoral system are fully supported to meet adequate food production and reducing hunger, poverty and rural unemployment without associated ecological harm. The adoptive water intervention technology and cultural system of cultivation was to be proved as best water practices by NITI Ayog, Government of India in 2019 for food production, sustainability and livelihood security in Bundelkhand region of Central India. The main purpose of this study is to replicate such type of technology for adequate food production and livelihood security in other same morphogeological regions.

Key Words:*Nutrition, food production, food availability, sustainable food security, livelihood security*

Vegetarian proteins (TVP) by extrusion technology for texturizing making plant-based meats: an overview

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Abstract

There has been a rapid increase in global population during the past two centuries, along with changing life style of consumers and their growing preference for convenient, fresh-like healthy and minimally processed food products. To meet this growing demand, new and improved protein rich food products need to be processed using advanced and emerging technologies. The world population grew 30% from 1990 to 2010.The consumption of proteins from animal products is projected to increase by more than 50% by 2030 as compared to 2000. To satisfy this expanding demand, industrial livestock production has multiplied, leading to discussions about the environment effect & sustainability, Ethical Issues about Animal Welfare Human Health consequences. Crop production for animal feed will have to increase by more than 60% in the same period (Westhoek et al., 2011). The resulting increased meat production from animal proteins has a significantly high impact on the carbon footprint (i.e., producing 1 kg of beef produces about the same amount of CO_2 emission as driving 100 km or over 63 miles in a car). It also takes about 15 kg of vegetable feed to produce just 1 kg of animal protein. That means plant-based proteins are an essential component in feeding the earth's growing population and reducing the carbon footprint at the same time. This can be achieved by Vegetarian Proteins (TVP) by converting globular protein into fibrous protein with the help of Extrusion Technology. The objective of this review is to discuss plant based - meat product and to satisfy the expanding demand of the protein rich product and also emphasizing on clean technologies, such as extrusion technologies.

Keywords: *Extrusion technologies, TVP, globular protein, fibrous protein.*

Solar tunnel dryer: a review

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Abstract

Solar energy is one of the greatest source of renewable energy and it is referred to as the energy that comes from the sun's rays. Solar energy can be utilized in many ways including heating houses, providing electricity, distillation of seawater, etc. Solar water heater, solar cooker, lantern/LEDs are other gadgets which have been developed by various engineering institutes. Among the various applications, solar drying is one of the important applications, since times immemorial. In villages, it has been a common household practice to preserve vegetables like peas, potato chips, carrot, turnip, cauliflower, ginger, onion, fenugreek, chibbar/kuchri (fruit of a weed called *Cucumis sativus*), aonla, mango for Amchur Powder, pomegranate seeds for Anardana etc. through drying using sunlight. However, in this process quite good quantity of final produce is spoiled due to moulds, which develop if the sunlight is not proper due to cloudy or rainy days. Even natural colour, texture and appearance of the product is not retained. Solar tunnel dryers offer an improved drying method for small and medium holder farmers. A typical solar tunnel dryer reduces the time required to dry the products from 1 to 5 days depending on the crop, can increase the productivity of the harvest by reducing the amount of product lost to moisture and reduces the amount of labor involved in drying products. Moreover, during the high season where the productivity level is high and the probability of decomposition is higher in which the farmers will have to sell their products at low price. The solar food dryer will decrease the financial losses as the crops could be stored without any decomposition for a longer time after the drying process.

Keywords: *solar drying, solar tunnel dryer, solar water heater, drying etc.*

Exploration of protein from Himalayan cheese as a wall material for improving the bioavailability of resveratrol

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Abstract

Resveratrol is a known antioxidant, anticancerous and cardioprotective bioactive. The low bioavailability and poor water solubility of resveratrol is a major barrier that restricts its usage in food applications. To overcome these problems, the study presents micro and nano encapsulation of resveratrol in casein micelles extracted from Himalayan cheese (*Churpi*). Resveratrol loaded casein microparticles (CS-rm) were synthesized using freeze drying whereas resveratrol loaded casein nanoparticles (CS-rn) were synthesized using ultrasonication. Both were characterized using dynamic light scattering (DLS), scanning electron microscopy (SEM) and attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR). DLS revealed hydrodynamic diameter of 71.24 µm and 387.023 nm and zeta potential of -22.62 and -28.08 mV for CS-rm and CS-rn. The characteristic peaks of resveratrol at 965.4, 1380.86, 1586.66 and 1607 cm^{-1} confirmed successful micro and nanoencapsulation. CS-rm displayed high encapsulation efficiency (52.32 %) and swelling power (77.90; pH 3 and 68.65; pH 7.5) than CS-rn. Both micro and nanoencapsulation protected resveratrol in gastric conditions however CS-rn showed high release of resveratrol in simulated intestinal conditions. The anti-oxidant and anti-cancerous activity of resveratrol under simulated gastric and intestinal conditions (SGJD) was significantly higher ($p \leq 0.05$) for CS-rn, showing that nanoencapsulation improved release and nutraceutical profile of resveratrol.

Subcritical treatment of olive oil: Minor phenolic composition and antioxidant properties of the solvent extracts

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Abstract

Olive oil extracted from four exotic olive cultivars was subjected to subcritical treatment using green and organic solvents. The minor phenolic compounds were identified and quantified by RP–HPLC–DAD. Significant ($p \leq 0.05$) variation in the phenolic compounds and antioxidant properties was observed with respect to cultivar, solvent and the extraction conditions. For the methanolic and ethanolic extracts, the antioxidant properties generally increased upon subcritical treatment but decreased drastically for subcritical water extraction. Besides correlation among hydroxytyrosol, tyrosol and oleuropein, the multivariate analysis revealed high correlation of antioxidant properties with hydroxytyrosol, oleuropein, tyrosol and apigenin. The principal components analysis (PCA) revealed two components explaining 86.6% variability. PCA separated aqueous and organic solvents both at ambient and subcritical conditions in the score plot. The loading plot exhibited maximum positive loadings of the analyses. It is concluded that subcritical water extraction could be manipulated for the recovery of oleuropein and hydroxytyrosol from olive oil.

Keywords: Oleuropein; Hydroxytyrosol; Subcritical water extraction; Multivariate analysis; Principal components analysis

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