AMITY INSTITUTE OF FOOD TECHNOLOGY

BOOK OF ABSTRACTS

8TH AMIFOST 2025

INTERNATIONAL CONFERENCE ON THE FUTURE OF FOOD SCIENCE & TECHNOLOGY: INNOVATIONS, SUSTAINABILITY AND HEALTH

HYBRID

27th – 28th March 2025 • Amity University Noida (Delhi NCR) India

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OVERVIEW

Over the last 50 years, food systems have transitioned from rural to industrialized models, impacting diets, health, livelihoods, and environmental sustainability. Climate change compounds these challenges, with extreme weather, shifting agricultural patterns, and rising temperatures threatening food security.

To address this, sustainable innovations in food science and technology are essential. These advancements will revolutionize food production, consumption, and distribution while tackling global issues like climate change, nutrition, and environmental impact.

ABOUT 8TH AMIFOST 2025

The 8th AMIFOST 2025, hosted by the Amity Institute of Food Technology, focuses on ***"The Future of Food Science & Technology: Innovations, Sustainability, and Health."*** This conference explores key trends and collaborative strategies to create a resilient and sustainable food ecosystem. By uniting farmers, researchers, policymakers, and consumers, we can build a food system that nourishes both people and the planet.

AMITY INSTITUTE OF FOOD TECHNOLOGY

International Conference on

Recent Advances and Future Prospects in formatting a Healthier Food System

8TH AMIFOST 2025

INTERNATIONAL CONFERENCE ON THE FUTURE OF FOOD SCIENCE & TECHNOLOGY: INNOVATIONS, SUSTAINABILITY AND HEALTH

(27th- 28th March 2025)

BOOK OF ABSTRACTS

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FOUNDER PRESIDENT'S MESSAGE

It is a matter of great pride that Amity Institute of Food Technology (AIFT), Amity University Uttar Pradesh (AUUP), Noida campus is organizing **8th Amity International Conference of Food Scientists and Technologists (AMIFOST 2025)** on **"The Future of Food Science & Technology: Innovations, Sustainability and Health"** on Thursday, 27th March and Friday, 28th March, 2025.

Over the years, this annual conference has evolved into an event where eminent professionals, industry experts, scientists and researchers from the area of food technology converge to exchange knowledge and do brainstorming on the different aspects of the area. With the presence of highly specialized brains with distinguished accomplishments sharing their invaluable experiences and views, the conference has emerged as a valuable platform for indepth discussions on cutting-edge science, sustainable innovation and transformative health solutions from the area of food technology, which is of immense importance for the food security of our nation.

The theme of the conference deserves appreciation as there is a symbiotic relationship between innovations, sustainability and health in the era of climate change and global warming. The increasing role of artificial intelligence and big data in food production, predictive analytics will help optimizing yields, reduce waste and create climate-resilient crops, thus effectively addressing important health issues globally.

I extend my hearty welcome to all eminent leaders from the Food Processing Sector, distinguished scientists, nutritionists, subject experts and other worthy participants from the industry, various national and international universities, institutions and research establishments. I am sure that their deliberations on such an important theme would pave the way for forging bonds and mutual cooperation, undertaking research collaborations, joint projects and publications, learning the best international practices for achieving long-term goals and establishing significant and lasting contacts for mutual benefits. It will be an enriching experience for brilliant faculty members, scientists, research scholars, research fellows, students and other worthy participants.

My sincere appreciation to all the distinguished members of the Advisory Committee and the Technical Committee for their valuable advice.

I compliment Dr. V.K. Modi, Director, AIFT, a highly acclaimed professional in the area & Chairperson, **AMIFOST'25**, and all the members of organising committee of **AMIFOST'25** including Dr. Monika Thakur, Convener, Dr. Renu Khedkar, Organising Secretary as well as the dedicated faculty members, brilliant and vibrant students, research scholars and staff for their praiseworthy efforts in ensuring the success of this conference under the valuable guidance of Prof. (Dr.) Balvinder Shukla, Vice Chancellor, AUUP. The most strategic and visionary leadership of Dr. Atul Chauhan, Chancellor, AUUP and President, Ritnand Balved Education Foundation (RBEF), would lead to outcome based and result oriented success of the Conference.

I warmly welcome all participants and hope they have a memorable and enriching experience that not only contributes to the goals of **AMIFOST'25**, but also leave a profound impact on the fellow participants.

(Dr. Ashok K. Chauhan)
Founder President
Ritnand Balved Education Foundation (RBEF)
(The Foundation of Amity Institutions and the
Sponsoring Body of Amity Universities)

Blessings by Chancellor Sir

Dear Esteemed Delegates, Researchers, and Guests,

It is with immense pride and excitement that we present the proceedings of the 8th Amity International Conference on the Future of Food Science & Technology (AMIFOST-2025). This conference is a testament to the growing significance of food science and technology in addressing contemporary challenges and opportunities, particularly in innovation, sustainability, and health.

As we strive to fulfill the Sustainable Development Goals (SDGs), we recognize our critical responsibility in shaping a food system that is both innovative and sustainable, ensuring the well-being of present and future generations. The theme of this year's conference reflects our shared commitment to advancing scientific knowledge while safeguarding our planet's future. We stand at a transformative moment in history, where the integration of groundbreaking technologies, sustainable practices, and a strong focus on human health has the potential to revolutionize the global food industry.

The proceedings you hold are the result of the hard work, creativity, and dedication of researchers, academics, and professionals who have contributed to this conference. Their invaluable contributions encompass diverse aspects of food science—ranging from innovations in food processing and biotechnology to sustainable agricultural practices and advancements in food safety. Furthermore, by emphasizing health, we ensure that the solutions we develop are designed not only for today but also for future generations.

We firmly believe that AMIFOST-2025 serves as a vital platform for bringing together diverse stakeholders, fostering collaboration, and igniting innovative ideas that drive positive change across the global food ecosystem. This conference is not merely a forum for presenting research—it is a hub for collaboration, dialogue, and problem-solving in food science and technology.

Moving forward, it is imperative that we continue investing in innovation, sustainability, and health within the food sector. We are confident that the discussions, exchanges, and partnerships formed at AMIFOST-2025 will lead to lasting impacts on the future of food systems worldwide.

We extend our deepest gratitude to all contributors and look forward to the new frontiers of knowledge, cooperation, and growth that will emerge from this gathering.

Thank you for your participation and commitment to shaping the future of food.

Warm regards,"

Dr. Atul Chauhan
Chancellor, Amity University
President, Ritnand Balved Education Foundation
CEO, AKC Groups of Companies

Message by Hon'ble Vice Chancellor Madam

It gives me great pleasure to share that Amity Institute of Food Technology (AIFT) is organising ***8th edition of Amity International Conference on the Future of Food Science & Technology (AMIFOST-2025*****) from 27th – 28th March 2025 at Amity University Noida campus.** This event is not just a conference, it is a **crucible of groundbreaking ideas, transformative solutions, and inspiring collaborations** that will shape the global food landscape for young enthusiasts and researchers from the food industry.

For all researchers, academic leaders, and passionate advocates for innovation, **science is the most powerful tool for solving humanity's grandest challenges.** Among these, **food security, nutrition, and sustainable agriculture stand as critical pillars** that determine the health, well-being, and survival of billions.

With **rapid evolution of food science**, there is a great demand for bringing solutions to **the threats of climate change, resource depletion, and global malnutrition.** At **Amity University**, our mission is to **bridge the gap between scientific breakthroughs and real-world implementation** to ensure that **innovation benefits society at large.**

This conference is an opportunity to go **beyond discussions, deliberations and turn ideas into action. It's aims at collaborating across disciplines, industries, and borders to forge new partnerships, inspire groundbreaking research, and build a resilient food system that will nourish our planet and people for centuries to come.**

I extend my deepest appreciation to the organizers, sponsors, and participants who have dedicated their time and efforts to make AMIFOST a reality. I am certain that the diligent work and steadfast commitment of the AIFT Organizing Team led by Prof. (Dr.) V K Modi, will lead to the fruitful outcomes.

I wish AMIFOST-2025 a grand success!

Prof. (Dr.) Balvinder Shukla
Co-Patron, AMIFOST 2025
Vice Chancellor, Amity University Uttar Pradesh

Mr. Anand Chordia

Director - Innovation & Technology, Suhana Spices
Founder – The Eco Factory Foundation

Dear Delegates, Researchers, and Esteemed Guests,

It is with great pleasure to be associated with 8th AMIFOST – 2025 on the theme “Future of Food Science & Technology”. As we embark on this exciting journey together, it is truly an honour to be part of a global community of thought leaders, researchers, and innovators dedicated to shaping the future of food science and technology.

The theme of this year's conference, "Exploring Sustainable Solutions for a Healthier and Safer Food Future," is both timely and critical. Our global food system is facing unprecedented challenges – from ensuring food security, mitigating climate change impacts, and improving food safety. The road ahead will require collaborative effort, innovation, and a deep understanding of the emerging trends in food science.

We at Suhana (Pravin Masalewale) always implement sustainable practices such as lean manufacturing which ensures minimum wastage at all levels & reduced cost of manufacturing. We have India’s first Net Zero Energy & Net Zero Waste certified Warehouse from IGBC & Global NetZero.

Through the proceedings of AMIFOST-2025, a platform for sharing groundbreaking research, fostering discussions on critical issues, and identifying sustainable solutions, will drive the food industry forward. The contributions presented here not only highlight the advancements in food science but also reflect our collective commitment to addressing the pressing challenges of our time.

As we move towards the future, it is crucial that we continue to bridge the gap between scientific research and practical application. I encourage each one of you to engage deeply, ask questions, and share ideas that can inspire change within your fields and communities. The insights gained from this conference will be a stepping stone toward building a healthier, more sustainable global food ecosystem.

I extend my heartfelt gratitude to all the participants, speakers, and partners who have made this conference possible. Together, we will continue to pave the way for a brighter future in food science and technology.

Thank you, and I look forward to the fruitful discussions and collaborations ahead.

Warm regards,
Mr. Anand Chordia
Director - Innovation & Technology, Suhana Spices
Founder – The Eco Factory Foundation

Narrendra Mohan

*Former Director, National Sugar Institute, Kanpur
*Advisor, Indian Sugar & Bioenergy Manufacturers Association
*Director-Independent, Regreen Excel Industries Ltd.
*Director-Independent, KM Sugar Mills Ltd.
*Advisor, Ceylon Sugar Industries Pvt. Ltd., Sri Lanka
*Member, International Society of Sugarcane & Sugar Technologists
*Life Member, Association of Food Technologists of India

11.03.2025

MESSAGE

It is pleasure to note that Amity Institute of Food Technology, Amity University, Noida is organizing 8th AMIFOST-2025, International Conference on "The Future of Food Science & Technology: Innovations, Sustainability, and Health" on 27th – 28th March 2025.

Over the last decade or so, advances in Food Science and Technology are revolutionizing how we produce, prepare and consume food. The emerging food science trends are proving that these rapid changes continue and are not slowing anytime soon. Common consumer today is in search of healthy and nutritious food selections, while ensuring that production is as sustainable to the extent possible. In today's world while convenience remains a high priority, sustainability and personalized options are becoming increasingly important as well.

In future, Food Science and Technology is required to promise world with more sustainable, nutritious, and personalized food systems, fueled by innovations like alternative proteins, precision agriculture, and advanced food processing techniques.

I am confident that this conference will help all the participants to gain a deeper understanding of the latest trends in Food Science and Technology, and particularly students as it can help them kick-start a career in this expanding and evolving industry.

I wish the conference a great success.

N. Mohan

(Narendra Mohan)

AMITY UNIVERSITY
UTTAR PRADESH

DR. W. SELVAMURTHY, Ph.D., D.Sc.
FAMS, FABMS, FIMSA, FIANS, FIAY

President
Amity Science, Technology and Innovation Foundation
Amity Foundation for Science, Technology & Innovation Alliances
Director General, Amity Directorate of Science & Innovation
Chancellor, Amity University Chhattisgarh and
Chair Professor for Life Sciences
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March 21, 2025

MESSAGE

It is my great privilege and honour to extend a warm welcome to all distinguished guests, researchers, industry leaders, and policymakers at the 8th AMIFOST, themed "Future of Food Science & Technology: Innovation, Sustainability, and Health." This conference envisions to bring together leading minds from academia, research institutions, industry, and policy-making bodies to deliberate on the future of food science and its transformative role in fostering a healthier and more sustainable world.

We are witnessing a new era in food science, where groundbreaking advancements in Agri-biotechnology, food processing, artificial intelligence, and smart packaging are revolutionizing the way food is produced, distributed, and consumed. Innovation stands as a driving force for change, addressing critical challenges such as food security, nutrition, and environmental sustainability. This conference serves as a crucial platform to explore circular economy models, renewable energy integration in food production, sustainable packaging solutions, and strategies for waste reduction.

As we navigate the complexities of global food systems, it is imperative to embrace policies that encourage environmentally responsible agricultural practices while ensuring economic viability for farmers and stakeholders. By fostering collaboration across disciplines and sectors, we can work towards solutions that balance innovation with sustainability, ensuring that nutritious, safe, and accessible food remains a fundamental right for all.

Contd…2

L Block, 2nd Floor, A-1 Wing, Amity University Campus, Sector-125, Noida-201 303, Gautam Buddha Nagar, U P (INDIA)

I encourage all participants to engage in insightful discussions, share pioneering research, and contribute to shaping a resilient future for food science and technology. Let this gathering inspire a collective vision where scientific advancements align with sustainability and human well-being, paving the way for a food-secure future.

I extend my sincere appreciation to the organizing committee, esteemed speakers, researchers, and industry experts who have contributed to making this event a reality. Your unwavering commitment to excellence has laid the foundation for a conference that promises to be intellectually enriching and impactful.

I eagerly look forward to the exchange of knowledge, the fostering of meaningful collaborations, and the emergence of groundbreaking ideas that will shape the future of food science and technology. May AMIFOST-2024 serve as a catalyst for innovation, learning, and professional networking, inspiring all participants to contribute towards a more sustainable and health-driven food ecosystem.

My best wishes for the success of this event, with the hope that it leads to tangible and fruitful outcomes, paving the way for lasting advancements in the field.

Together, let us embark on a journey towards a future where food innovation not only meets industry demands but also nurtures a healthier planet and society.

With best regards,

Yours sincerely,

W. Selvamurthy

Dr. W. Selvamurthy

Prof. V K Modi. Ph. D. (Food Technology), PDF (UK), UNUF, FAFST
Head of Institute
Former Chief Scientist, Professor AcSIR and Head
CSIR-Central Food Technological Research Institute, Mysore

Message by Head of Institute

We are delighted to welcome esteemed delegates, researchers, academicians, industry professionals, and students to this pivotal conference on "The Future of Food Science and Technology: Innovation, Sustainability, and Health." This event serves as a platform to exchange knowledge, discuss advancements, and foster collaborations in the dynamic field of food science and technology.

The food industry is undergoing a transformation driven by technological innovations, environmental concerns, and consumer health priorities. Scientific research is essential to meeting global food demands while ensuring safety, nutrition, and sustainability. Emerging technologies such as artificial intelligence, biotechnology, and nanotechnology are revolutionizing food processing, while advancements in alternative proteins, functional foods, and precision nutrition redefine production and consumption. Innovation has always shaped food science, from pasteurization to 3D-printed foods and lab-grown meat. Researchers are exploring novel ingredients, smart packaging, and enhanced processing methods to meet consumer expectations. AI and big data analytics optimize supply chains, predict foodborne illnesses, and ensure quality control, bridging sustainability and efficiency.

Sustainable food production is imperative in addressing climate change, resource utilization, and food waste. Circular economy models, eco-friendly packaging, and alternative proteins, such as plant-based and cultured meat, reduce environmental impact. Sustainable agriculture practices like vertical farming, precision agriculture, and regenerative farming reshape responsible food production.
The link between food and health is crucial as global challenges like obesity, malnutrition, and chronic diseases rise. Functional foods, fortified products, and personalized nutrition enhance public health. The demand for transparency, traceability, and clean-label products underscores the need for continuous research in food formulation, dietary interventions, and safety regulations.

Collaboration is key to shaping the future of food science and technology. This conference unites experts from academia, industry, and government to share insights, address challenges, and explore solutions. Through dialogue and networking, we bridge the gap between research and industry, driving meaningful progress.

We extend our gratitude to all keynote speakers, panelists, researchers, and attendees for their contributions. Special thanks to the Patron-in-Chief, Hon'ble Founder Sir Dr. A.K. Chauhan, Patron and Chancellor Dr. Atul Chohan, Co-Patron Dr. (Prof.) Balvinder Shukla, and the Advisory Committee for their support. We also appreciate the speakers and sponsors for their invaluable contributions. May this conference inspire new ideas, partnerships, and innovations that propel the food industry toward a sustainable and technologically advanced future.

Dr. V K Modi
Amity Institute of Food Technology
Amity University Uttar Pradesh – 201303

Dr. Monika Thakur
Professor
Amity Institute of Food Technology
Amity University Uttar Pradesh

Message by Convener

As the global population continues to grow, the demand for food is increasing at an unprecedented rate. At the same time, the challenges posed by climate change, resource depletion, and rising health concerns are putting immense pressure on our food systems. In this context, ***8th edition of Amity International Conference on the Future of Food Science & Technology (AMIFOST-2025*)** is planned with **the** theme of "***The Future of Food Science and Technology: Innovation, Sustainability, and Health"*** is not only timely but essential.

Innovation in food science and technology holds the key to transforming how we produce, process, and consume food. By leveraging cutting-edge technologies, such as biotechnology, food engineering, and artificial intelligence, we can address critical issues like food security, waste reduction, and the development of healthier food options. These advancements are not only about improving food quality but also about creating solutions that are both economically viable and environmentally responsible.

Sustainability, too, is a central focus of this theme. Our food systems need to be reimagined in a way that reduces their environmental footprint, conserves natural resources, and promotes resilience against the challenges posed by climate change. From sustainable agricultural practices to innovative packaging solutions, the future of food lies in creating systems that can thrive within the planet's ecological limits.

Equally important is the emphasis on health. With rising concerns about diet-related diseases and global health issues, the food industry must prioritize the production of nutritious, safe, and accessible food. Food science must move towards creating products that contribute not only to taste and convenience but also to improving public health and well-being.

This theme serves as a call to action for researchers, policymakers, and industry leaders to collaborate, innovate, and drive change that will shape a healthier, more sustainable future for food. It invites us to explore how science and technology can pave the way for a world where food systems are more resilient, equitable, and aligned with the health of both people and the planet.

We are sure that the deliberations and discussions held at the conference would be beneficial to all the stakeholders. We are thankful to the esteemed speakers and participants from all over the globe to have shown great interest in the conference.

monika

Dr. Monika Thakur
Amity Institute of Food Technology
Amity University Uttar Pradesh – 201313;
mthakur1@amity.edu

AMITY INSTITUTE OF FOOD TECHNOLOGY

International Conference on

The Future of Food Science & Technology: Innovations, Sustainability, and Health

27th–28th March 2025

DAY 1 (Thursday, 27th March 2025)
Timing as per Indian Standard Time (IST)

INAUGURAL SESSION
Joining Link: https://amity-edu.zoom.us/webinar/register/WN_wO-rJ9f6Q0uwV5mSKhTYgg
Venue: F-2 Block Auditorium, Amity University Campus, Sector-125, Noida, India

Time	Session
9:00 am -10:15am	Registration & Networking Tea
10:15 am –10:20am	Welcome address by **Dr. Renu Khedkar** Organizing Secretary, Amity Institute of Food Technology, AUUP, Noida, India
10:20am-10:25am	Lighting of lamp
10:25am– 10:30am	Introduction to the theme by – **Dr. V K Modi** Professor & HoI, Amity Institute of Food Technology, AUUP, India
10:30am – 10:40am	Address by **Dr. W. Selvamurthy** President - Amity Science, Technology & Innovation; Foundation, Director General - Amity Directorate of Science & Innovation, AUUP, India
10:40am – 10:55am	Address by **Prof. (Dr.) Balvinder Shukla** Hon'ble Vice Chancellor, AUUP, India
10.55am– 11:15am	**KEYNOTE ADDRESS** **Dr Manfred Büchele**, Managing Director, Kompetenzzentrum Obstbau Bodensee, Germany
11:15am- 11:35am	**INAUGURAL ADDRESS – CHIEF GUEST** **Mr. Siraj Hussain**, IAS, Advisor Food Processing, FICCI, Former Secretary MoFPI & Dept. of Agriculture and Co-Operation, Ministry of Agriculture, GoI, India
11:35am-11:55am	Address by **GUEST OF HONOUR** **Dr. A. K. Tyagi,** Executive Director, Haldiram Group of Companies, Noida, UP, India
11:55pm – 12:15pm	**BLESSINGS & SHARING OF THOUGHTS** **Dr. Ashok K Chauhan**, Ritnand Balved Education Foundation & Chairman, AKC Group of Companies, India
12:15pm – 12:25pm	Release of **Souvenir – 8th AMIFOST 2024** & **Proceedings of 7th AMIFOST-2024 in Scopus Indexed Journal**
12:25pm–12:30pm	Vote of Thanks by **Dr. Monika Thakur**, Convener, Amity Institute of Food Technology, AUUP, Noida, India
12:30pm- 12:45pm	Group Photograph
12:45pm- 1:45pm	Networking Lunch

DAY 1 (Thursday, 27th March 2025)
Venue: F-2 Block Auditorium

TECHNICAL SESSION - 1
Theme – Sustainable Food Systems, Food Production & Food Security

INVITED SPEAKERS	
Time	**Session**
1:50pm- 2:10pm	**Keynote Speaker: Prof. (Dr.) Mukesh Jain**, Professor, SC & IS, JNU, Delhi, India
2:10pm – 2:30pm	**Session Chair: Mr. V.K. Verma**, Assistant Commissioner, Food Safety & Drug Administration (FSDA), GoI, Meerut, UP, India
2:30pm – 2:50pm	**Prof. (Dr.) Karuna Singh**, Dean, Sharda School of Allied Health Sciences, Sharda University, Greater Noida, UP, India
2:50pm -3:00pm	Q & A and Panel Discussion
3:00pm-3:20pm	Networking Tea

TECHNICAL SESSION -2
Theme: Nutrition, Health & Functional Foods

INVITED SPEAKERS	
Time	**Session**
3:20pm-3:40pm	**Session Chair: Dr. Neerja Hajela**, Head, Science and Regulatory Affairs, Yakult Danone Indi Pvt. Ltd., Delhi, India
3:40pm -4:00pm	**Prof. (Dr.) Debabrata Sircar,** Biosciences & Bioengineering Dept., IIT- Roorkee, India
4:00pm - 4:20pm	**Prof. (Dr.) Shri Ram Yadav**, Department of Biosciences and Bioengineering Indian Institute of Technology, Roorkee, India
4:20pm-4:40pm	**Prof. (Dr.) Ana Sanchez- Silva**, Faculty of Pharmacy, University of Coimbra, Portugal
4:40pm – 4:50pm	**Q & A and Panel Discussion**

DAY 1 (Thursday, 27th March 2025)
Venue: F-2 Block Auditorium

TECHNICAL SESSION - 3 (ONLINE MODE)

Theme: Harnessing Nanobiology for Agri-Food Technology

Joining Link: https://amity-edu.zoom.us/meeting/register/6gSnGwT8RX6yICNGg6OvMw

INVITED SPEAKERS

Time	Session
6:00-6:10pm	**Session Chair: Prof. Shivendar Sahi,** Saint Joseph's University, Philadelphia, Pennsylvania, United States
6:10-6:35pm	**Keynote: Prof. Jason White**, The Connecticut Agricultural Experiment Station, New Haven, CT 06511, USA
6:35-6:55 pm	**Prof. Renato Grillo**, Department of Physics and Chemistry São Paulo State University – UNESP; Ilha Solteira, SP, Brazil
6:55-7:15pm	**Prof. Luzia Valentina Modolo**, Departamento de Botânica, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627, Belo Horizonte, 31270-901, Brazil
7:15-7:35pm	**Prof. Francisco J Corpas**, Department of Stress, Development and Signaling in Plants, Group of Antioxidants, Free Radicals and Nitric Oxide in Biotechnology, Food and Agriculture, Estación Experimental del Zaidín Spanish National Research Council, CSIC, C/ Profesor Albareda, 1, 18008 Granada, Spain
7:35-7:55pm	**Prof. Halley C. Oliveira**, Department of Animal and Plant Biology, State University of Londrina (UEL), Celso Garcia Cid Road, km 380, Zipcode 86057-970, Londrina, PR, Brazil
7:55-8:15pm	**Q & A and Panel Discussion**

Oral Presentations (Physical Mode)

Venue: F-3 MDP Room

Oral Presentations (Physical Mode) Venue – F-3 MDP room

Time	Session
2:00pm -5:00pm	**Themes**: 1,2 & 3

DAY 1 (Thursday, 27th March 2025)
Venue: F-2 Block Auditorium

Oral Presentations (I) (Online Mode)

Joining Link: Board 1: https://meet.google.com/fzm-ymyj-rzg
Board 2: https://meet.google.com/uei-ixou-nkk

Time	Session
2:00pm -5:00pm	**Board 1:** Theme 1& 2 **Board 2:** Theme 3

POSTER PRESENTATION (PHYSICAL MODE)

Venue: F-2 Foyer

Time	Session
27th March 2025 (2:00pm -5:00pm)	**Board 1:** Theme: 1, 2 & 3 **Board 2:** Theme: 4, 5 & 6

e-POSTER PRESENTATION (ONLINE MODE)

Joining Link: Board 1: https://calendar.app.google/B7KYPHJPUFeFpTcB7
Board 2: https://meet.google.com/tvr-vgem-fgg

Time	Session
27th March 2025 (12:00pm -4:00pm)	Theme: 1, 2 & 3

DAY – 2 (Friday, 28th March 2025)
Timing as per Indian Standard Time (IST)
Venue: F3 Seminar Hall
Technical Session 4, 5, 6
Joining Link: https://amity-edu.zoom.us/meeting/register/zz7Azm8tTpiGgaW2oaJYWg

TECHNICAL SESSION - 4
Theme: Current Trends in Food Science & Technology

INVITED SPEAKERS

Time	Session
10:30am - 10:50am	**Session Chair: Prof. (Dr.) Rupesh Deshmukh**, Prof. and Head, Central University of Haryana, Mahendragarh, Haryana, India
10:50am - 11:10am	**Mr. Aman Chowdhary**, Founder, Anmol Industries, Gr. Noida, India
11:10am - 11:25am	**Dr. Rachna Sehrawat**, Dept. of Food Process Engineering, NIT, Rourkela, India
11:25am - 11:35am	**Q & A and Panel Discussion**

TECHNICAL SESSION-5
Theme: Food Safety & Quality

INVITED SPEAKERS

Time	Session
11:50am - 12:05pm	**Session Chair: Mr. Surender Raghav**, Director, National Food Laboratory, Ghaziabad, India
12:05pm-12:20pm	**Ms. Shilpa Agrawal**- Director-SRA, Indian Food & Beverage Association, Delhi, India
12:20pm - 12:40pm	**Dr. Prabodh Halde**, Head- Global Regulatory, Public Policy & Advocacy, Marico Industries, Mumbai, India
12:40pm - 1:00pm	**Dr. Miguel Angel Prieto Lage**, Nutrition Food Group (NoFoG), University of Vigo, Spain
1:00pm - 1:15pm	**Q & A and Panel Discussion**
1:15pm - 2:15pm	**Networking Lunch**

DAY – 2 (Friday, 28th March 2025)
Timing as per Indian Standard Time (IST)
Venue: F3 Seminar Hall
Technical Session 4, 5 & 6
Joining Link: https://amity-edu.zoom.us/meeting/register/zz7Azm8tTpiGgaW2oaJYWg

TECHNICAL SESSION - 6
Theme: Current Trends in Food Science & Technology

INVITED SPEAKERS

Time	Session
2:15pm - 2:35pm	**Session Chair: Mr. Abhishek Biswas**, Founder, Sattvik Council of India
2:35pm - 2:55pm	**Prof. Dr. Sanjay Bhayana**, Professor, Department of Food Business Management and Entrepreneurship Development NIFTEM, Kundli, Haryana, India,
2:55pm - 3:15pm	**Mr. Ashutosh Chharia**, Sr. Manager, Panchtattva International Company (PICO), Vietnam
3:15pm - 3:30pm	**Q&A Session and Panel Discussion**

ORAL PRESENTATIONS (PHYSICAL MODE)
Venue: F-3 MDP Room

Time	Session
9:30am-12:30pm	**Themes:** 4, 5,6

VALIDECTORY SESSION

Joining Link: https://amity-edu.zoom.us/webinar/register/WN_S_7g1k7vSvqgmI5Frcp5Kw

28th March 2025

F-3 Seminar Hall, Amity University Uttar Pradesh, Noida

Time	**Session**
3:30pm – 5:00pm	**Conference Report - Dr. Monika Thakur**, Convenor, 8th AMIFOST
	Sharing of thoughts - Dr. Alrun Albrecht Senior Publisher ELSEVIER, Germany
	Chief Guest: Mr. Ramesh Agarwal Managing Director, Agarwal Packers & Movers Ltd., New Delhi
	Guest of Honor – Mr. Vinamra Sharma, Director (Tech & Projects) MSME, GoI
	Award distribution (Best Oral & Poster presentations)
	Felicitation of Judges of Paper Presentations
	Blessings by **Hon'ble Founder President - Dr. Ashok K Chauhan**, **Prof.(Dr.) Balvinder Shukla** – Vice Chancellor & **Dr. W. Selvamurthy** Director General- ADSI, Amity University Uttar Pradesh
	Concluding remarks by **Dr. V K Modi**, HoI, Amity Institute of Food Technology, Amity University Uttar Pradesh
	Vote of Thanks – **Dr. Renu Khedkar,** Organizing Secretary, 8th AMIFOST
	Group Photograph followed by HIGH TEA

TABLE OF CONTENT

THEME 1

Sustainable Food Systems

S.No.	Research Title
1	A Comprehensive Review of Edible Cutlery: An Emerging Alternative to Single-Use Plastics *Saroj Pathan, Namita Patil*
2	Effectiveness Of Hermetic Bag for Long-Term Storage of Pearl Millet Grains *Jayasree Joshi T and P. Srinivasa Rao*
3	Malting Millets: Unlocking Enhanced Bioavailability of Nutrients *Shweta A. Patil, Iranna S. Udachan*
4	Bioactive Effects of Chicory (*Cichorium intybus*) *Divyanshi Tiwari, Divita Jain, Anisha Adya, Mayuri Rastogi*
5	Watermelon Seed Olegels: A Nutritional and Sustainable Alternative to Conventional Solid Fats *Chanchal B, Kumar, V*
6	A Comprehensive Review on Oilseed Cakes and Their Use as Functional Foods *Shubhra Sinha, Vipul Kumar*
7	Next-Generation Approaches to Food Waste Valorisation: Extraction, Recovery and Nano-Assisted Enhancement *Saloni S Kasegaonkar, Esha R. Deshpande, Kiran S. Jagtap, Asmita M. Acharya*
8	An In-Depth Analysis of Iron-Enhanced Processed Foods Accessible on E-Commerce Platforms *Singh.A[1] and Avinash.P[2]*
9	Integration Of Green Processing Methods to Develop Meat Analogue from Plant Based Protein *Akansha Srivastava, Kanchan Bisht, Shahwar Siddiqui*
10	Determining Oilseed Suitability: Proximate Analysis and Functional Properties for Targeted Food Applications *Yogita R. Mirajkar, Asmita M. Acharya, and Akshaya K. Sahoo*
11	Impact of Bio-Fertilizers on Growth, Yield and Quality of Spinach (Spinacia Oleracea L.) *Ajit, Guneshori Maisnam, Sangeeta Pandey*
12	The Nutritional Composition of Red Algae Species Highlights Their Potential Application in The Transition to Sustainable Functional Food Systems. *M. Carpena, A. Perez-Vazquez, P. Barciela1, F. Chamorro, S. Seyyedi-Mansour, A. Silva, M.A. Prieto*
13	Food Losses and Wastage within the Food Supply Chain; Connecting the Dots with Sustainable Food System: An Overview *Apoorva Sarwal, Lakhwinder Kaur*

14	Cellulose-Based Food Packaging Materials from Fruit Processing Byproducts *Raksha R. Bhelave Sheetal D. Deshmukh Sachin K. Sonawane*
15	Emulgel-Based Edible Oleofilms: Innovative Functional Packaging for Foods *Sweekriti Choudhry, Anurag Singh*
16	Characterization And Evaluation of Biodegradable Films Based on Cellulose Microfibers of Cow Pea and Field Bean Pods *Maddi Harika Sai, Thokada Rohini Kumari, K. V. Chaitanya Bhagavathi and A. Padmaja*
17	Development Of Biodegradable Cups from Corn and Fruit Processing Waste and Its Characterization *Sangram S. Wandhekar, Kshirsagar R B, Sadawarte S K, Rinkesh A. Gosavi, Vaszko Gabor, Ayaz Mukarram Shaikh, Bela Kovacs*
18	Effect of Organic Manures on Growth of Cabbage *Nongthombam Cherri Chanu, Justine Sanasam, Sangeeta Pandey, Guneshori Maisnam*
19	The formulation of Nutritious Vegan Burger Patty incorporating with Millet: A Better Plant-Based Substitute *Mallick P, Thukral B*
20	Urban Agriculture as A Catalyst for Sustainable Food Systems: Enhancing Dietary Diversity and Food Security in Urban Area *Bhawika Bisht*
21	Evaluation of Red Macroalgae as Biomass Feedstock for Biofuel Production *M. Carpena, P. Barciela, A. Perez-Vazquez, F. Chamorro, A. Silva, M.A. Prieto*
22	Utilizing Agro-Waste for Sustainable Methylcellulose Production *Chitra Sudalaimani, Senthil Subramanian, Srinivas Janaswamy*
23	Plant Based Protein: Drivers and Barriers to Future Food Diets to Reduce Meat Over Consumption *P. Barciela, A. Perez-Vazquez, M.Carpena, A.O.S. Jorge, Rafael Nogueira-Marques, Ezgi Nur Yuksek; A.G. Pereira, M.A. Prieto*
24	Industry 5.0 Innovations for Waste Management and Circular Economy in Sustainable Food systems: A systematic review *Snehal Gaikwad, Kishor Anerao*
25	Impact Of Sustainable Practice on Spinach Production *Vizenuo Khezhie, Neetu Singh*
26	Effects Of Different Drying Techniques on The Composition of Mango Leaves Powder and Their Utilization as Nutritive Food Colour *Aditya Mahajan, Mandeep Singh Sibian*
27	Effects of Different Drying Techniques on the Composition of Giloy Leaf Powder and their Utilization as a Nutritive Food Colour *Parminder Kaur, Mandeep Sibian*
28	Physiochemical Characterization of Dried Bamboo Leaf Powder and Its Utilization in the Development of Value-Added Products. *Rabisha Sareen, Mandeep Sibian*

29	Potential Role of Purple Yam in Gut Microbiota Modulation: A Comprehensive Review *Jessica Nongspung and Mandeep Singh Sibian*
30	Exploring The Role of Mustard Seed Meal as A Potential and Sustainable Food Ingredient: A Comprehensive Review *Phibari. A. Tongper, Mandeep Singh Sibian*
31	Current Innovations in the Food and Nutraceutical Applications of Millets *Aditi Jain, Ashwani Kumar and Devendra Kumar Bhatt*
32	Corncob Cellulosic Residue Etherified to Water Soluble Hydroxypropyl Cellulose *Santosh Rijal, Senthil Subramanian, Srinivas Janaswamy*
32	Evaluation Of Functional and Physicochemical Properties of Black Wheat and Comparing Effect of Processing on Anthocyanin Retention *Muskan Yadav, Vidhu Yadav, Priya Dangi Malik*
34	High Procurement Rates and their Impact on Sustainable Agriculture: Evidence from three States Shaped by the Green Revolution *Mayank Kamboj, Pooja Mehra*
35	Assessing The Carbon Footprint and Sustainability Index of Indian Agriculture *[1]Sunayana Mittal and [1]Dr. Pooja Mehra*
36	Sustainable Innovation in Functional Foods: Development of Iron-Rich Jam using Palmyra Jaggery (Borassus Flabellifer) *Ms. Tannu Goswami, Pratibha Singh*
37	Chlorine Free Nanocellulose Based Rice Husk Edible Coating on Kale Leaves: Approach Towards Circular Economy *Anamika Thakur, Abhijit Kar, Alka Joshi, Dinesh Kumar, Renu Singh*
38	Enhancing STEM Education through Sustainable Food Practices: A Pedagogical Approach *Poonam Tiwari, Shreya Pandey*
39	Study of Some Essential Oils on *Botrytis Cinerea* and *Leuconostoc mesenteroides* *Megha Sen, Priya Srivastava, Harsha Sejwal, Arjun Sharma, Sumedha Mohan*
40	Dragon Fruit Peel: A Step Towards Sustainability *Mohit Thorecha, Yogesh Kumar, Yachana and Ashutosh Upadhyay*
41	Utilization of Banana Peel as a Bioactive Ingredient: Potential Applications in the Food Industry *Mausam kumari, Zoobiya Islam*
42	Heat-Sealable Biodegradable Films from Cellulosic Residue of Wheat Biomass *Sharad Bhattarai, Srinivas Janaswamy*
43	Future Food Innovations: Sustainability, Safety, And AMR Mitigation *Shailly Sharma, Taru Singh*
44	Natural Pigments – Substitute to Synthetic Pigments for Food Colouration *Bhawana Kumari, Mridula Chaturvedi, Navpreet Kaur, Shashi Sharma**

45	Exploring the properties of traditional Indian non-basmati aromatic rice variants *Kalanamak*, *Adamchini* through Metabolomic approach *Shubham Yada, Raj Kumar Duary*
46	The Role of Herbal Tea in Functional Foods: A Comprehensive Review of Health Benefits and Applications *Tamasree Bhattacharya, Ankita Jagannath Lakade*
47	Development and Quality Evaluation of Sweet Potato-Cauliflower Greens Salty Bites: A Sustainable Approach to Value-Added Snacking *Diya Dal and Sunayan Sharma*
48	Evaluation of Nutritional and Sensory Properties of Gluten Free Crunchy Bites *Vedika Kohli, Meena Kumari*
49	Formulation, Standardization and Nutritional Assessment of Protein - Rich Ready to Cook Pancake Mix for Malnourished Children *Khushi Sikka and Meena Kumari*
50	Beans A Sustainable Substitute for Meat Proteins: A Comprehensive Review *Kashvee*
51	The Samovar and Its Role in Kashmiri Tea Culture – Traditional Brewing Methods and their Impact on Flavour and Nutrition *Hadeeqa Zehra*
52	A Circular Food Economy Approach to Food Sustainability Via Synthesis of Nanoparticles Using Agri-Waste *Sarrah Dawood, Bobbili Anusha, Niharika Shanker*
53	Chakao (Black Rice, *Oryza, Sativa* L,): Superfood on The Verge of Recognition *Kenbi Ngomdir, Niharika Shanker*
54	Media Optimization for Amylase Production Through OFAT Using Onion Peel as Substrate *Anila Zahid, Renu Khedkar*
55	Cascara Kombucha: Enhancing Functionality Through Sustainable Fermentation *Adengada Monisha Ponnamma Subbiah, Sukreetha Rasamani*
56	CORN COBS: The Future of Sustainable Food Innovation *Sejal Jain, Sakshi Sukhija*
57	Innovations in Bakery Product Development *Tanishk Tiwari, Monika Thakur*
58	Pomegranate Peel and Seed Valorization *Manjunatha Varma, Risal, Sai Keerethan*
59	Egg powder *Sai Keerethan, Risal, Manjunatha Varma*

60	Sustainable Packaging Practices in the Fruit and Vegetable Industry *Yati Patel, Loveleen Sharma*
61	Development of Nutritionally Enriched Millets Based Traditional Products Using Waste from Cauliflower & Cabbage Leaves *Sanskriti Krishnatray, Ankita Jagannath Lakade*
62	By Product Utilization Of Fruits and Vegetables Peels *Yashna Prasad*
63	Strategic Business Development for Food Technology Solutions: A Market-Driven Approach *Sushmit Chakraborty, Sakshi, Dilip Malani*
THEME 2 *Impact of Climate Change on Food production and Food Security*	
1	Impact of Climate Change on Food Production and Food Security: A Review *Sakshi Muskan*
2	Ethanol Blended Petrol and its Impact on Indian Agriculture *Sarah Mark, Guneshori Maisnam and Ashwini Ananda*
3	Salinization of Soil – A Consequent of Climate Change Threatens Food Security: A Review *Chaitali Bose*
4	Adapting Food Systems to Climate Change: Integrating Innovation, Sustainability, and Food Security in the Modern Era *Mahua Bhattacharya, Naboshree Bhattacharya*
5	Impact of Climate Change on Food Production and Food Security: Challenges and Adaptation Strategies *Ronak Kuri, Naresh Kumar, Prahlad Sahay Sharma*
6	A Study of Cultivation and Extraction of Patchouli Oil *Nabiha, Guneshori Maisnam and Ashwini Ananda*
7	Blockchain Technology in Food Supply Chain: Transparency and Traceability *Priyanuj Sharma, Deepshikha Thakur and Atharv Gupta*
8	A Study of Role of Artificial Intelligence in Precision Farming *Kriti Kohli, Kshitij Parmar*
9	Development Of Sunscreen Cream Containing the Mixed Extract from Sand Ginger (*Kaempferia Galanga* L.) Rhizome and Coat Buttons (*Tridax Procumbens* L.) *Punrada Amornphan, Worapong Kitdamrongtham, Charinya Chankhampan, Charu Gupta, Supakorn Silakate, Aranya Manosroi, Jiradej Manosroi*
10	Development of Anti-Aging Cream Containing Extract from Red Bell Sweet Pepper Fruits (*Capsicum annuum* L.)

	Thitiwara Jarupratkul, Charinya Chankhampan, Worapong Kitdamrongtam, Charu Gupta, Supakorn Silakate, Jiradej Manosroi, Aranya Manosroi
11	Development of Anti-aging Cream Containing the Extract from Mango (*Mangifera indica* L.) Leaf *Wikanda Tangprasert, Worapong Kitdamrongtham, Charinya Chankhampan, Charu Gupta, Supakorn Silakate, Aranya Manosroi, Jiradej Manosroi*
12	Impact of Rising Temperatures on Horticultural Crops in Hilly areas *Anil Kumar, Deepshikha Thakur*
13	Sustainable Agriculture and Economic Growth: Addressing CO_2 Emissions in Global Leading Economies *Muskan Kataria, Pooja Mehra*
14	Behavioural Shifts for a Greener Future: Urban Food Waste Segregation and Energy Solutions *Dharani A, Pooja Mehra*
15	Impact of Fermented Organic Manure (FOM) on Soil Health and Microbial Diversity in Sustainable Agriculture *Tushar Yadav, Deepshikha Thakur*
16	Impact Of Climate Change on Soil Health *Atharv Gupta, Deepshikha Thakur, Priyanuj Sharma*
17	Status and Drivers of Crop Diversification in Indian States: An Economic Analysis *Shweta Singh , Pooja Mehra, Gurinderjit Kaur, Namita Kapoor*
18	Lentils (*Lens Culinaris*): Nutritional Food Source During Changing Climatic Conditions Sagar Ruhal, Soom Nath Raina, Apekshita Singh
19	From Farm to Table: the Impact of Environmental AMR On Food Safety and Quality *Pooja Sharma, Taru Singh*
20	Textile Dye Removal Using Adsorbent Beads: Implications for Water Safety and Agricultural Sustainability *Anshika Jain, Shivanshi Tyagi, Surbhi Sinha, Anamika Singh*
21	Decoding Gene Expression Pattern of Phyllosphere Bacterium for Sustainable Agriculture *Shifa Chaudhary, Binu Bhat, Shivani Sharda*
22	Climate Variability and Food Security: Examining the Impact of Rainfall and Temperature on Indian Agriculture *Harshita, Namita Kapoor, Pooja Mehra*
23	Plasma-Activated Water: A Novel Eco-Conscious Bio stimulant for Enhancing Seed Germination and Plant Growth *Jai Badola, Sakshi Sukhija*
24	Impact of fermentation on the nutrition profile of traditional foods Ananya Dhyani. Niharika Shankar

25	Exploring the Impact of Bifidobacterium on Inflammation in Colorectal Cancer *Saketh Reddy, Maharaj Karthik, Niharika Shanker*
26	Climate Adaptive Bio Film *Gupil Garg, Khushi Gupta*
27	Impact of climate change on soil-borne diseases and horticultural crop production in Sagar district, Madhya Pradesh: A study. *Shubhi Agrawal and Neetu Singh*
28	Ecofriendly and sustainable management of soil borne diseases of fenugreek under changing climate conditions. *Akash Chingtham, Neetu Singh*
THEME 3 *Nutrition, Health & Functional Foods*	
1	Effect of Turmeric (*Curcumin*) on Cancer Patients: A Comprehensive Review of its Anticancer Mechanisms, Clinical Efficacy, and Potential Therapeutic Applications *Rupanshi Garg, Nishma Singh, Swati Sharma*
2	Plant Based Ready to Use Protein Beverage for Fitness – A Sustainable Food Solution *Poojitha Gali, Pradeepthi Marri, Tapasya Anand*
3	Development And Sensory Evaluation of Multi-Grain Crackers for The Management of Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) *K. Sai Lavanya, A. Sumana*
4	Maharashtrian Traditional Pearl Millet Chunks (Bajra Kharwadi): A Nutritious Snack *Janhavi Manjule Sheetal D. Deshmukh*
5	Innovating Vegan Nutrition for Athletes: A Comprehensive Approach to Developing Soya-Based Protein Bar *Hephsiba Talari, Ganesh Bairi, Meghana Veshala, Chhavi Taliwal*
6	Assessing Smoking Determinants in Students: A Predictive Model Based on Anxiety, Distress, and Sleep Patterns *Tinni Chaudhuri, Joyeta Ghosh, Soma Chakraborty, Nusba Javaid*
7	Nutritional and Functional Properties of Quinoa and Amaranth *Mahek S. Gupta, Sheetal D. Deshmukh*
8	Marine Microalgae: The Future of Functional Foods and Sustainability *Imana Pal*
9	Foods Effect Health: Children Who Are Health-Conscious' Perceptions of Functional Foods and Good Eating *Pooja Tripathi, Kalpana Patni*

10	Depression and Nutritional Status: Examining Their Association *Samridhi Bhattacharjee, Priyanka Chatterjee, Indira Dutta, Joyeta Ghosh, Sanjukta Kar*
11	Assessing the Link Between Nutritional Health and Menstrual Cycle Regularity in Female College Students *Priyanka Chatterjee, Indira Dutta, Samridhi Bhattacharjee, Dr. Joyeta Ghosh, Sanjukta Kar*
12	Exploring the Link Between Sleep Disorders and Nutritional Status: Implications for Health and Well-Being *Indira Dutta, Priyanka Chatterjee, Samridhi Bhattacharjee, Sanjukta Kar, Joyeta Ghosh*
13	A Comprehensive Review on Impact of Ascorbic Acid on Cancer Therapy *Shireesha Mukka, Harika Vasa, Maheshwar Mekam*
14	An Investigation on the Impact of Nutrition and Mental Health on Working Individuals in The Meerut NCR Region *Saba Khan, Neetu*
15	Protective Role of Dietary Fibre in COPD Management: A Critical Review *Shashi Mathur, Pratibha Singh*
16	Natural Nutritional Enrichment of soya and groundnut paneer with micro millet extract *Revathi V, Keisha Dharani, Pitta Deepika, Samaja Taniyala, Bolugu Sagarika, Kamala Golla*
17	Positive Impact of Germination & Biofortification on the Content and Bioaccessibility of Zinc in Sindoor Saal- A Light Bran Folk Rice Variety *Bellapu Ravvala Shreya, Sai Sruthi Shree K K, Sri Manogna Pathri, Srividya Nagarajan*
18	Unlocking The Potential of Ash Gourd *Tina Ngangbam, Prachi Avinash*
19	Development and Sensorial evaluation of modified traditional breakfast recipes for the management of metabolic dysfunction-associated steatotic liver disease (MASLD) *Annapoorna Sai Sathya. V, Dr. A. Sumana*
20	Yellow kiwi: from by-product to food ingredients. Phytochemical and nutritional potential of the peel and pomace in functional food *F. Chamorro, Rafael Nogueira-Marque, J. Echave, P. Donn, Ezgi Nur Yuksek, A.G. Pereira, M.A. Prieto*
21	Biofortification Of Food Crops Through Agronomical Interventions to Alleviate Hidden Hunger In Human Beings *Rajni Sharma, Hari Ram*
22	Butterfly Pea Flower (*Clitoria ternatea*): A Hidden Superfood for Health and Wellness *Sonali S. Sawant, Iranna S. Udachan*
23	Processed Kodo Millet Flour: A Nutrient-Rich Functional Food for Sustainable Nutrition and Health *Diksha Thakur, Manisha Kaushal, Gaurav Verma*
24	Nutritional and Functional Enhancements in Colored Sorghum Cultivars Through Popping: Impact on Bioactive Compounds and Antinutritional Factors *Kishor K. Anerao, Kailash. S. Gadhe, Snehal S. Gaikwad, Rushikesh. P. Mane, Prasad S. Gangakhedkar*

25	A Comprehensive Review on Functional Beverages Incorporated with Cherry (*Prunus avium*) And Peach (*Prunus persica*) in Health Enhancements *Suvarsha Raj, Divita Jain, Akansha, Aditi Rikhari*
26	Nutritional Assessment and Dietary Habits of Young Adults with Night Eating Syndrome *Anshu Sharma, Akansha*
27	A Comparative Study of AI-Generated Personalized Meal Plans Versus Traditional Dietary Guidelines for Weight Management *Shambhavi Rai, Aditi Rikhari*
28	Impact of Black Pepper (*Piper nigrum*) Powder on Lipid Profile Parameters in Non-Alcoholic Fatty Liver Disease Patients *Beenish Zohra, Suyash Saxena, Mirza, Shruti*
29	The Impact of Maternal Dietary Patterns on Pregnancy Outcomes *Vidushi Kumari, Neetu Yadav*
30	Development of Gluten-Free Pasta Using Teff and Rice flour: a Study on Nutritional, Functional, and Sensory Properties *Shaiqua shakee , Akansha, Aditi Rikhari*
31	Exploring the Role of Ashoka Tree Bark in Modulating PCOS: Current Evidence and Future Directions *Sonia, Rohit Potter, G.B.Bhatt*
32	Revitalizing Gluten-Free Brownies with *Lepidium stavium* L. seed Mucilage as a Fat Replacer. *Bhawna Tyagi, Karuna Singh, Muskan Chadha*
33	Glycaemic Optimised Chocolate for Diabetic Patients *Ananya Mohan, Vasudha Sharma*
34	Assessment Of Dietary Habit and Physical Activity Among Young Adults in Greater Noida *Sarfarj Ajnani, Neelesh Kumar Maurya*
35	Exploration of Antidiabetic Potential of *Pterocarpus marsupium*: A Review *Stuti Sharma, Mahak Sharma*
36	Beetroot Pomace: A functional additive for muffins Alka Joshi, Shruti Sethi, Anamika Thakur, Dinesh Kumar, BS Tomar
37	Development of Active Vitamin B12 Rich Ready to Drink Composite Fruit Beverage *Amandeep Singh, Devaraja HC, Monika Sharma*
38	Development and Impact of Ragi-Based Functional Mayonnaise Enriched with Ashwagandha and Moringa: A Sustainable Plant-Based Alternative *Yukta Mittal, Lakhvinder Kaur*
39	Assessment of Knowledge, Attitude, and Practice Towards Healthy Dietary Habits Regarding Anaemia Among College-Going Students of Greater Noida *Anu Kumari Mahato, Mayuri Rastogi*
40	Nutritional Knowledge, Attitude and Practices Among Families in Children with Cancer *Kalpana Gupta, Karuna Singh, Akanksha Rai, Ritika Samaddar, Sahar Afreen*

41	Meeting The Changing Protein Needs of Populations *Yachana[1], Mohit Thorecha[2], Yogesh Kumar[3] and Ashutosh Upadhyay[4]*
42	Milk Thistle (*Silybum Marianum*): A Comprehensive Review of Its Therapeutic Potential and Food Applications *Bharti*
43	Black Rice: An Emerging Functional Food with High Nutraceutical Value *Riddhima Singh, Manisha Sharma, Pooja Singh, Soom Nath Raina, Apekshita Singh*
44	Unveiling the Health Benefits of Underutilized Seeds of Foxnut as a Nutraceuticals *Himani Bisht, Zoobiya Islam*
45	A Comprehensive Review on Therapeutic Potential of *Andrographis Paniculata (Kalmegh)* in Management of Diabetes *Priya Bajaj, Mahak Sharma*
46	Optimizing Health and Nutrition Status of Migrant Construction Workers and Preparation of Premix *Mitanshu Singhal, Aditi Rikhari*
47	Optimizing Health and Nutrition Status of Migrant Construction Workers and Preparation of Premix *Sofia Saifi, Aditi Rikhari*
48	Holistic Approach to Telomere Health and Premature Aging *Diksha Chaturvedi*
49	Optimizing Pregnancy Outcomes: The Role of Zinc and Vitamin A Supplementation *Garima Singh*
50	Development And Characterization of Milk Flaxseed-Based Fermented Composite Beverage for Female Health *Vikram, Sangita Ganguly, Himanshu Kumar Singh, P.N. Raju, A.K. Singh*
51	Microbiome and Dietetics: An Emerging Frontier in Combating AMR and Enhancing Human Health *G. Dharshana Malya, Shoma Paul Nandi, Shivani Sharda*
52	Maternal Knowledge and Practices on Infant & Young Child Feeding in a Delhi Tertiary Hospital: A Cross-Sectional Study *Geetanjali Tahilramani, Karuna Singh, Dr Saroj Kumar Kar & Alka Mathur*
53	Study of the Chemical Composition and Quality Parameters of Edible Vegetable Oils *Sristi Singh and Karuna Singh*
54	Unveiling The Health Benefits and Therapeutic Properties of Roselle (*Hibiscus sabdariffa*): A comprehensive Overview *Silkysandila Yumnam, Vasudha Saxena, Aayushi, Meena Kumari*
55	Exploring the Bioactive Properties of Propolis: A Comprehensive Overview of Its Nutraceutical Potential *Vasudha Saxena and Meena Kumari*
56	Protein Supplements: Hype or Health? *Ishika Bansal, Akansha, Shreya Sharma, Srishti Gambhir, Niharika Shanker*

57	The Role of Iron Supplementation in Pregnancy: Balancing Deficiency and Overload" *Radhika Chaturvedi, Meena Kumari*
58	Exploring the Scope of Dietetic Practice in Managing Multimorbidity In Older Adults *Sudipta Das, Soumi Chakrabarty*
59	Fortified Foods: and its Effectiveness in Reducing Nutrient Deficiencies *Urja, Niharika shanker*
60	Therapeutic Diets and Their Impact on Accelerating Patient Recovery *Neerja Arya, Meena Kumari*
61	Micronutrient Intake and Its Clinical Impact on Hospitalized Chronic Kidney Disease Patients *Mansi Sharma, Soumi Chakraborty, Richa Sharma*
62	Protein Supplementation in Preventing and Managing Individuals with Chronic Kidney Disease *Gopika S Menon, Niharika Shanker, Upasana Parv Kalra*
63	Understanding The Mechanism Behind Coronary Artery Disease *Janvi Garg, Niharika Shanker*
64	Personalized Nutrition Using AI and Gut Microbiome Analysis *Anshika Malhotra, Ankita Lakade, Kanika Khanna*
65	Clinical Recommendations for Coffee Consumption in Heart Disease Patients *Anushka Singh, Meena Kumari, R. S. Puri*
66	Exploring the Link Between Diet and Alzheimer's Disease *Khushi Agarwal, Khushi Kumar, Somya Jain, Kashish Jain, Niharika Shanker*
67	Effect of probiotics on type 2 Diabetes mellitus patients *Eshika Goyal, Kumari Khushi, Niharika Shanker*
68	Harnessing the Anti-Inflammatory Power of Traditional Indian Diet *Deepti Gupta, Ankita Jagannath Lakade*
69	Addressing mental health stigma in urban India: challenges and strategies *Merin Mary Zachariah, Rudrika Ghildiyal, Yashna Prasad, Niharika Shanker*
70	Role of Multi Micronutrient Supplementation in Foetal and Parental Development *Ritu, Sunayan Sharma, Neelam*
71	The Role of Nutraceuticals in the Prevention and Management of Type 2 Diabetes *Sehjal Arora, Ankita Lakde, Deepika Kohli*
72	Exploring Millet Fortification and the Role of Phytosterols in Cardiovascular Disease Prevention *Kotha Harshitha, Anuja, Niharika Shanker*

73	Nutrigenomics and Precision Diets for Chronic Disease Management *Komal, Niharika Shanker, Aanchal Aggarwal*
74	A Study on Knowledge, Attitude and Practice Towards Breastfeeding Among Lactating Mothers on Infant Growth and Development: Impact of Socio Demographic Determinants *Ishika Singh and Sunayan Sharma*
75	Development Of Gluten-Free Biscuits Using Makhana Flour, Inulin, And Natural Sweeteners: A Functional Food Innovation *Shweta Sharma, Adya Goenka, Divita Shree Goel, Ashish Chauhan, Renu Deepak Khedkar*
76	Study Of Bioactive Properties of Black Carrot Powder Prepared by Freeze Drying and Tray Drying Techniques and Its Utilization in Value Added Products *Spriha Rai, Sakshi Sukhija*
77	Gut Microbiome Mechanism and Its Progression In CKD: Potential Therapeutic Strategies *Anubhuti Sachdeva, Noor Ansari, Sunayan Sharma*
78	An Assessment of a Basil-Based Drink Enhanced with a Fruit Mixture for Improved Flavor and Nutritional Value *Ishpreet Kaur Sarna, Monika Thakur*
79	Makhana: A Nutrient Dense Super Food for Optimal Health *Ananya Kumari, Niharika Shanker*
80	Innovations in Carbonated Beverages: Functional and Health-Oriented Drinks *Vatsala Shukla, Mandeep Kaur*
81	Advances In Phytoestrogen Extraction: Techniques, Applications, And Therapeutic Potential *Komal Goel and Soumi Chakraborty*
82	Postbiotics: Novel Bioactive Metabolites in Gut Microbiome Modulation and Health Promotion *Deepshikha Dey, Priyanshi Jain, Simran Aloria, Tanishka Jain, Niharika Shanker*
83	Seeds Of Serenity: How The Seed Cycle Supports PCOS & PCOD Wellness *Ramsha Zulfiqar Qureshi, Ankita Jagannath Lakade*
84	Nutritional Challenges in Cancer Patients: Impact, Deficiencies, and Management Strategies *Anshul Chauhan, Renu Deepak Khedkar*[2]
85	Functional And Biochemical Properties of Bekang: A Review *Caleb Lalramchuana*
86	Edible Insects as a Source of Protein: Potential, Sources, Methodologies and Challenges *Nilanjana Saha, Neha Sharma*

87	Phytochemicals: Exploring Alternative Therapies for Inflammatory Bowel Disease *Jhanvi Nikhil Arora, Niharika Shanka*
88	Role Of Art in Changing Brain Activity and Lowering Stress: the Neuroscience Of Creativity *Nilanjana Saha, Prakriti Sharma, Arpit Kaul, Niharika Shanker*
89	Omega-3 Fatty Acids: Key Players in Cognitive Function and Brain Health *Nishtha Mittal, Niharika Shankar*
90	Strategies and Challenges in Biofortifying Millets for Improved Nutrient Bioavailability *Jahanvi Garg, Niharika Shanker*
91	Herbal Supplementation in the Body *Khushbu Gupta, Meena Kumari, Namisha Chablani*
92	Formulation Of Functional Fruit Spread Using a Plant Based Gum: A Healthier Alternative *Aditi Kohli, Monika Thakur*
93	Understanding Gut Dysbiosis in Obesity and the Effects of Functional Foods on Microbiome Health *Lochan Soni, Niharika Shanker*
94	Formulation and Analysis of Horsegram cookies S. *N.Chaudhari, S. B. Bhand*
95	Food Fortification with Functional Ingredients: Studying the Effects of Fortifying Foods with Vitamins, Minerals, And Probiotics on Health Outcomes. *Teesha Sikarwar, Monika Thakur*
96	Nutritional Importance and Health Benefits of n-3 and n-6 PUFA's: Essential Fatty Acids and Dietary Sources Ruchi Verma, Munazza Aslam Khan
97	Development of Innovative Gluten-Free Cookies: Enhancing Flavour and Nutrition Madalageri Deepa, Nagesh Raksha, Krishnamurthy Ramyashree, Takkalaki Saniyaanjum
98	From Root to Refreshment: Characterization and Nutritional Quality Assessment of Black Carrot (*Daucus carota* L. sativus) Juice Shubham Gangwar, Priya Awasthi, Vigya Mishra, Akhilesh Chandra Mishra, Ashutosh Rai[3], Gaurav Shukla, Shikhangi Singh
99	Impact of amla and turmeric powder supplementation on glycemic control in young adults (20-39 years) with non-insulin-dependent diabetes Roli Saini & Ankita Gupta

100	Food Cravings: The Science of Food Cravings and Their Impact on Health *Harshita Sharma, Divya Chaudhary, Khushi Tyagi*
101	Decoding the Glycan Code: Implications for Cellular Processes and Biomedical Research *Asmita Roy, Joyeta Ghosh[1], Sanjukta Kar*
102.	Nutraceuticals: Health benefits and Microbial contribution *Deepshikha Thakur1*, Devashish Pathak[2] and Vineet Shyam[3]*
THEME 4 *Current trends in Food Science & Technology*	
1	Innovative Biodegradable Packaging Films from Cellulose-Chitosan Complexes *Sumi Regmi, Srinivas Janaswamy*
2	Valorization Of Agro-industrial Wastes: Study of the Microencapsulation of a Multi-Source Antioxidant-Rich Extract *Pacheco C, Piña J, Nazareno MA, Gupta C*
3	A Review on Non-Thermal Processing Techniques for the Extraction of Millet Seed Protein *Rituja Upadhyay, Kaaviya Sri RR*
4	Development And Nutritional Evaluation of Biscuits Incorporating White Finger Millet (KMR-340) And Parbhani Shakti Sorghum *Anushree R. K, B.S. Agarkar Swaroopa G*
5	Inulin as a Functional Ingredient in Food: Technological Applications, Stability, and Consumer Acceptance *Akansha Srivastava, Shahwar Siddiqui*
6	A Comprehensive Study on the Development and Optimization of Functional Cookies Based on Finger Millet and Jaggery Using Simplex Lattice Mixture Design Approach and Correlation Between Quality Parameters *Namita Patil, Gurunath Mote, J. A. Khot, K. Prathapan*
7	Development Of Crackers Using Buckwheat and Defatted Soy Flours *Amarashree B, Aishwarya V. Patil*
8	Development Of Multigrain Baked Bhakarwadi *Harshvardhan kadam, Namita Patil, Guru Nath Mote, K Prathapan*
9	Pulsed Electric Field Technology for Food Preservation *Kirti Mantri, Sheetal D. Deshmukh*
10	Optimization of Okra Polysaccharide Extraction Using Response Surface Methodology *Rituja Upadhyay, V Lekhashri*
11	Unlocking the Potential of Pumpkin Seeds in Food Applications: A Comprehensive Review *Rubina Yasmin, Saraswati Biswakarma, Sanjukta Kar*

12	Bio-Based Synthesis of Antimicrobial Nanoparticles from *Butea monosperma* and *Hibiscus-rosa sinensis* for Enhanced Packaging Application *Shweta R. Dode, Sneha V. Karadbhajne*
13	Impact Of High-Pressure Processing on The Quality and Shelf-Life Extension of Seafood. *Arpeet Yoseph Ramteke, Sneha V Karadbhajne, Sheetal D. Deshmukh*
14	Liposomal Technology: A New Approach to Improving Functionality & Bioavailability of Active Molecules in The Food Industry *Shantanu Jayant Patil, Sneha V Karadbhajne, Sheetal D Deshmukh*
15	Drying of Tomatoes Using Refractance Window Drying Technology and its Impact on Lycopene Retention *Darshana C Admane, Sneha V. Karadbhajne, Aarya Deshpande, Ashita Bagde*
16	Novel Biodegradable and Sustainable Packaging Films from Binary mixtures of Alfalfa Cellulosic residue and Carrageenan *Sandeep Paudel, Srinivas Janaswamy*
17	Exploration of Enzyme Modified Psyllium Fibre in Probiotic Frozen Dessert *Katke SD, Deshpande HW*
18	Biocomposites Revealed: Response Surface Modeling for Maximizing Flavonoid Recovery in Yellow Kiwifruit Peel *Rafael Nogueira-Marques, F. Chamorro, M. Carpena, A.O.S. Jorge, A.G. Pereira, M.A. Prieto*
19	Formulation And Nutritional Characteristics of Crackers Prepared From Germinated Amaranth And Wheat Flour *Sapna Malik, Akanksha Yadav*
20	Process Development and Sensory Evaluation of Cereal Based Probiotic Beverages Using Natural Cultures *Vaidehi Mande, SV Karadbhajne*
21	Plant Based Protein Extrudates: An Alternative to Animal Meat *Atharva Bhandare, Namita Patil*
22	Formulation And Characterization of Turmeric Essential Oil Encapsulated Powder for Applications in Dairy-Based Products *Maumita Adhikary, Kaushik Khamrui, Writdhama Prasad*
23	Optimization And Characterization of Fermented Honey (MEAD) *Rituja Upadhyay, Mir Faraaz Ali*
24	From Waste to Wealth: Exploring the Potential of Musa acuminata Residues in Mushroom Cultivation *Poornima Yadav, Shalini Singh Visen*
25	Real Time Deep Learning Model for Food Item Identification and Recipe Data Generation *Ronit Kumar Da s, Sanshruth Ralhan, Sweta Srivastava*
26	Recent trends in the application of Xanthan based films and coatings in Food Packaging *Sandesh D. Lokhande, Sneha V Karadbhajne, Sheetal D. Deshmukh*

27	Smart Packaging Technologies: Revolutionizing Product Shelf-Life Management *Sushil U. Lokhande, Sneha V. Karadbhajne, Sheetal D. Deshmukh*
28	Comparative Study Between Native and Modified Starches Isolated from Tamarind Seed *Shalvika Tripathi[1], Akansha[1*], Bushra Shaida[2]*
29	Utilisation Of Jackfruit Seed in The Development of Vegan Muffins. *Nidhi, Ms. Zoobiya Islam*
30	Development And Optimization of a Novel Synbiotics Maize Based Spread: Response Surface Methodology Approach *Muskan Chadha, Karuna Singh, Dantuluri Harshita, Shalini Choudhary, Ratnakar Shukla*
31	Redefining Traditional Indian Dairy Products Through Innovation: 3D Printing for Digitizing Burfi Production *Aparnna VP, Kaushik Khamrui, Writdhama G Prasad*
32	Texture Modified Protein Extrudates Prepared by Reactive Supercritical Fluid Extrusion *Bindvi Arora*
33	The Iron Boost: a nutritional snack with *Lepidium sativum* and *Oryza sativa*. *Priya Sharma, Priya Mishra*
34	Enhancing the Stability of Beetroot Betalain through Acidulants and Copigmentation *Brijesh Kumar Yadav, Thippeswamy Basavaraja, Alka Joshi, Shruti Sethi, and Bhoopal Singh Tomar*
35	Effect Of Micro-Nanobubbles on The Fermentation Pattern and Physicochemical Attributes of Stirred Yoghurt *Shefali Sirame, Pranav K. Singh, Santosh Kumar Mishra, Nitika Goel, Gajanan P Deshmukh, Neelkanth Nirmalkar*
36	Formulation and Process optimization and formulation of apricot-based water kefir fermented drink *Anisha Adya, Muskan Chadha, Ratnakar Shukla*
37	Functional Plant-Based Paneer: A Nutrient-Rich Innovation *Shivali Banerji, Priya Mishra*
38	Development of Black Rice Muffins Incorporated with Banana Flour *Ritu Duhan, Govind Ballabh Bhatt, Tonjam Khumanlembi Chanu*
39	Studies in Antioxidant Properties and Cytotoxicity of Dehydrated Red Peels of Dragon Fruit as Food Colour in White Dragon Fruit Juice *Shatabdi V Kamble, Tanu, Snehasis Chakraborty, Uday S. Annapure, Smita S. Lele*
40	Monk Fruit: The Future of Natural Sweeteners for Global Health, Sustainable Agriculture, and Diabetes Prevention *Sanya Chaudhary, Pratibha Singh*
41	Enhancing Food Ordering Accessibility: Real-Time Sign Language Translation with Generative AI *Parth Upadhya, Devansh Chamoli, Aman Chopra, Supriya Raheja*

42	Dehydrated Green Chickpea Chutney *Sania Gupta, Niharika Shanker*
43	3D Food Printing: A Technology Revolution in Food Manufacturing And Customization *Bindhya Prasad*
44	Extraction and Modification of Plant Based Proteins *Anshi Dahiya*
45	Intelligent Packaging: Innovations, Applications and Future Prospects *Jaskeerat Singh Ahuja, Mohd Adnan, Bhavasimrann Kaur Lamba*
46	Reducing Food Waste: Cold Storage Solutions for Fruits and Vegetables *Vanshika Gaur, Mandeep Kaur*
47	Pomegranate Peel and Seed Valorization *Manjunatha Varma, Risal, Sai Keerethan*
48	Vacuum Dehydration Technology for Ginger Candy *Raksha Shahane, Sakshi Sukhija*
49	Advancements in Plant Protein Modification through Cold Plasma Treatment *Soma Shree, Sakshi Sukhija*
50	Expansion in Dairy Fermentation Technology *Goel T, Kaur, M*
51	FTIR Spectroscopic Characterization of Dehulled Horsegram and Its Protein Hydrolysates: Implications for Functional Properties *Vatsala Sharma, Monika Thakur*
52	Date Seed Coffee-a Functional and Caffeine-Free Alternative to Traditional Coffee *Mekhla Singh, Riya Mahajan*
53	Fungi-Based Mycelium Scaffolds for Plant - Based Meat Texture Optimization *Siddhant Saini, Kirti Gaur, Sunidhi Raghuvanshi,*
54	Self-Healing Biopolymer Coatings for Extended Shelf Life of Fresh Produce *Sunidhi Raghuvanshi, Kirti Gaur, Siddhant Saini*
55	The Role of Technology in Scaling Mondelez’s Manufacturing Excellence *Rakshan SR, Monika Thakur, Pankaj Thakur*
56	Bioengineered Bacterial Cultures for Flavor Enhancement in Low -Sugar Foods *Kirti Gaur, Sunidhi Raghuvanshi, Siddhant Saini*

57	Upcycling Papaya By-Products in Tutti Frutti Manufacturing *Anushka Sharma, Ashish M Mohite*
58	Characterization of Moringa Leaves (M*oringa oleifera*) Dried Using different Drying Methods *Neha Sharma, Sakshi Sukhija*
59	Flavonoids: Potent Antioxidants in the Prevention of Free Radical Formation *Akshat Agrawal*
60	Next Generation Nutraceuticals: A Look into Advanced Processing and Formulation *Atharvan Joshi, Mandeep Kaur, Manish Kumar*
61	Shear Cell Technology: A Game Changer in Plant Based Meat Alternative *Riya Mahajan, Mekhla Singh, Sakshi Sukhija*
62	Ginger Alcohol *Risal, Manjunatha varma, Sai keerethan*
63	Development of cashew milk and almond milk incorporated paneer *Avni Samuel, Ashish M. Mohite*
64	Recent Advances in Cold Plasma Treatment (CPT) of Plant Proteins *Merin Mary Zachariah*, *Loveleen Sharma*
65	Pulse Electric Field Technique in Food Processing: A Review *Arpit Kaul, Mandeep Kaur*
66	3D Printing in Food Materials *Prakriti Sharma, Sakshi Sukhija*
67	Crunch with a Purpose: Nutrient-Rich Chips Crafted from Germinated Black Soybeans, Ragi, and Roasted Flaxseeds *Rudrani Bisht and Niharika Shanker*
68	Biobased And Edible Packaging *Bhavasimrann kaur lamba, Mohd Adnan, Jaskeerat Singh Ahuja*
69	Valorization of Cordia gum: A Natural Hydrocolloid for Functional Food Innovation *Ashmita Singh*[1] *and Monika Thakur*[2]
70	Manufacturing Process of Extruded Snacks *Dron Chaudhary, and Sakshi Sukhija*
THEME 5	

FOOD SAFETY AND QUALITY

1	Physio-Chemical, Organoleptic and Antioxidant Properties of Low-Sugar Health Beverage Prepared from Red Dragon Fruit Pulp and Papaya Leaf Juice *Ashwini M. Deshmukh, Vishnu K. Garande, Akshaya K. Sahoo*
2	Examine Plant-Based Extruded Meat Analogues Developed from Underutilized Legumes for Nutritional and Protein Quality Assessment *Swaroopa G, B.S Agarkar, Anushree R K, R.B Kshirsagar*
3	Effect Of Incorporation of Nutri-Cereals on Physico-Chemical and Sensory Attributes Of *Gulab Jamun* *Anupreet Singhm, Writdhama Prasad, Kaushik Khamrui and Shaik Abdul Hussain*
4	Partitioned Low and High Fiber Kodo Millet Flour *Patil Aishwarya, Pushpa Bharati*
5	The Effects of Dual Modification Techniques on Starch Quality: A Systematic Review *Shital A. Patil[1] and Siddharth M. Lokhande*
6	Effect Of Different Modification Techniques on Quality Characteristics of Hydrocolloids: A Systematic Review *Snehal P, Khandekar, Iranna S. Udachan*
7	Physicochemical and Sensory Attributes of the selected Plant-based Milk Analogues *M. Srijaya, B Lohita M., Vani Priya*
8	Gamma Irradiation Modifies the Structural, Thermal and Functional Properties Of Sorghum Protein Isolates *Sakshi Singh, Mehvish Habib, Khalid Bashir, Kulsum Jan*
9	Revolutionizing Food Safety: The Role of AI In Pathogen Detection *Bezawada Sree Sesha Sravanika, Jhinuk Gupta*
10	Assessing Labelling Transparency and Heavy Metal Contaminants in Commercial Protein Powders *Bavatharani V, Amrita Shaw, A. Sunil, Jhinuk Gupta*
11	A Systematic Approach to Investigate Labelling Accuracy of Commercially Available Indian Baby Foods *Rishika Aravapally, Amrita Shaw, Bezawada Sree Sesha Sravanika, Jhinuk Gupta*
12	Anti-Nutritional Factors in Insects and Their Impact on Nutrient Absorption *Sheetal D. Deshmukh, Fasaha Ahmad[2] Shweta Deotale[3]*
13	Shelf-Life Extension of Guava and Eggplant Fruits Using Chitosan-Sodium Alginate Based Antimicrobial Composite Coating Functionalized with Clove-Soy Lecithin Nanoemulsion *Jaishankar Prasad, Sujata P. Sharma*
14	Studies On Effects of Drying Methods on Quality Characteristics of Tomato Pulp Leather *Nitin Sonkar, Sheikh Mobin, Payal Bhati, Chitra Sonkar*

15	The Role of Food Safety and Food Quality on Public Health: A Review *Sunaina*
16	To study drying kinetics and quality analysis of pre-treated lotus rhizome slices *Vivek Kumar, Siddhant Mishra*
17	Antifungal Activity of Seaweed Ulva Lactuca Ethanol Extract Against Penicillium and Rhizopus Species *Usha Sharma, Sadhana Jadaun, Ringshangphi Khapudang and Saleem Siddiqui*
18	Quantification of Pigments in Different Brown Algal Species *M. Carpena, A.O.S. Jorge, A.G. Pereira, F. Chamorro, A. Perez-Vazquez, A. Silva; M.A. Prieto*
19	Camellia japonica Leaves: A Promising Source of Nutrients and Bioactive Compounds for Sustainable Food Systems *Ezgi Nur Yuksek, A.G. Pereira, J. Echave, F. Chamorro, P. Barciela, A.O.S. Jorge, M.A. Prieto*
20	Evaluation of PAHS traces in macroalgae extracts. *Aurora Silva, Cristina Soares, Maria Carpena, Rafael Nogueira-Marques, M. Fátima Barroso, M.A. Prieto*
21	Novel Non-Thermal Method for Shelf-Life Extension of Green Seedless Grapes *Siddaraju Anusha, Jai Badola, Pradeep Singh Negi*
22	Nutritional Evaluation of Local and Improved Varieties of Finger Millet: A Nutri-Cereal for Sustainable Food System *Debolina Chaki, Deepika, Ashwani Kumar, Anita Kumari*
23	Advances in Electrochemical Biosensors for Food Safety and Preservation: Smart Technologies for Rapid Pathogen Detection and Contaminant Monitoring *Nikita Rawal, Ranjana Pande*
24	Nutritional Profiling of Developed Ready to Eat Breakfast Cereal Using Popped Sorghum Bicolor and Eleusine Coracana *Shalini Choudhary, Karuna Singh, Muskan Chadha, Bhawna Tyagi, Ratnakar Shukla*
25	Comparative Analysis of Nutritional Quality Characteristics of Desi Chickpea (*Cicer arietinum* L.) Microgreens Var. Pusa-3062 And Pusa-4005 Grown Under Controlled Conditions *Tripti Sharma, Astha Gupta*
26	Studies on Replacement of Sodium Chloride with Magnesium Chloride in Black Gram Papad *Jamdar Jaya Laxman, Sahoo Akshaya Kumar*
27	Development And Evaluation of Functional Attributes and Shelf Life of Probiotic Processed Cheese *Deepak Kumar, Sangita Ganguly, Yogesh Khetra, P.N. Raju, Rashmi HM, Himanshu Kumar Singh*
28	Evaluating the Impact of Training Programs on Empowering Street Vendors in Punjab: Insights from Government of India Initiatives *Abhinav Kalra, Poonam Khanna, Kamalpreet Kaur Chahal, Rachna Shrivastava Tanvi Kiran, Sonu Goel, Nitin Kaushal*
29	Assessment Of Cadmium Contamination in Packaged and Raw Bovine Milk from Budhera, Gurgaon: A Comparative Analysis *Deepali Sharma*

30	Exploring the Impact of Goat-Cow Milk Admixtures on the Characterization and Metabolite Profile of Feta-Type Cheese *Hency Rose, Heena Sharma, Ashish Kumar Singh, Yogesh Khetra, Gaurav Kr Deshwal and Ankit Bihola*
31	Increasing Virulence of *Pseudomonas Aeruginosa* and its Herbal Remedies Impacting Food Storage, Consumption & Health *Saloni Santia, Mohini Agarwal, Manish Kumar, Taru Singh, and Kumud Bala*
32	Study the Nutritional, Functional and Sensory Properties of Millet-Based Extruded Noodles *Payal Chauhan, Rahul dev, Mahesh Gupta*
33	Proximate and Phytochemical Analysis of *Catharanthus Roseus* and *Ipomoea Batatas* and the Sensory Attributes of A Developed Product *Purvi Gupta, Aditi Rikhari*
34	Effect of Atmospheric Pressure Pin to Plate Cold Plasma on Physicochemical and Functional Properties of Lesser Yam *(Dioscorea esculenta)* Starch *Shilpa S. Pande, Uday S. Annapure*
35	Evaluating Storage Stability of Pomegranate and Orange Juices: A Comparative Temperature-Dependent Analysis *Deeksha Thakur, Mayuri Rastogi*
36	Gas Chromatography-Mass Spectrometry (GC-MS) Based Fatty Acid Profiling of Algae-Enriched Chocolate Spread Emulsion: Characterization and Nutritional Implications *Divita Jain, Akansha, Bushra Shaida*
37	Enhancing Nutritional Value of Milk and Milk Products *Yogesh Kumar, Yachana, Mohit Thorecha, Ashutosh Upadhyay*
38	Assessing The Effect of Commercialised Formulations for Purification of Reused Edible Cooking Oil *Sejal Ahuja, Divya Sanghi*
39	Development and Quality Evaluation of Amaranth Incorporated of Ghee Residue Nutritious Chikki *Jadhav Shanthilal, Anu Kumari, Shalu Giri*
40	Organoleptic, Microbial and Physio-Chemical Evaluation of Gut-Boosting Marmalade *Zonunmawi Janis Sinate and Sunayan Sharma*
41	Investigation Of Stone-Like Particles in Tastemaker Seasoning: Causes And Solutions *Sejal Sah*
42	Common Quality Control Tests During Beer Production *Naman Sondhi, Neha Sharma*
43	Food preservation Methods-Freezing Dehydration and irradiation *Shiva Tawker*
44	Haldiram’s Bread: A Review on bran and cereal bread and milk bread *Akriti Singh*

45	From contaminated water to thriving Field: Decolorization of dyes in textile effluent to reduce water pollution *Anshika Jain*
46	Nutritional Profiling of Germinated Black Soyabean Seeds: A Proximate Analysis Approach *Pranya Dutta, Soumi Chakraborty*
47	Risk Assessment and Management of Food Borne Pathogens in Ready-To-Eat-Foods *Kolisetty Hemanya, Samriddhi Johari*
48	Next-Generation Food Transparency: Blockchain Powered Real-Time Traceability for Ultimate Safety and Sustainability *Khushi Tyagi, Meena Kumari, Durga Tak*
49	Clean To Eat: Exploring Householding and Industrial Decontamination Methods for Fresh fruits And Vegetables *Rudrika Ghildiyal, Monika Thakur*
50	Challenges And Solution for Food Security in Developing Nations *Monika Pandey, Loveleen Sharma*
51	From Farm to Table: How Food Labels Influence Consumer Decision *Nainika Baidya, Neha Sharma*
52	Edible Coating Technologies: A Solution for Enhancing food Shelf Life and Quality *Angel Lhamu Sherpa, Meena Kumari*
53	Evaluation of Different Types of Oils Used for Frying in Snack Industry: A Review Based Exploration *Kashwini, Alok Saxena*
54	Advancing Plant Protein: The Role of Non-Thermal Modification Techniques In structural and functional enhancement *Charu Agarwal, Loveleen Sharma*
55	Biosensors as pathogen sensors in food packaging for real time contamination detection *Sukreetha Rasamani, Adengada Monisha, Ponnamma Subbiah*
56	Consumer Trends and Market Insights in Breakfast Cereals *Khushi Malik, Loveleen Sharma*
57	Recent Development in Antimicrobial Packaging *Mohd Adnan, Jaskeerat Singh Ahuja, Bhavasimrann Kaur Lamba*
58	Quality Control and safety in dairy processing *Mohit Sahu, Himanshu*

59	Review on Biosensors as pathogen sensors in food packaging *Sukreetha Rasamani, Adengada Monisha ponnamma Subbiah*
60	Shelf life & stability studies of chocolate enrobed apricot confection *Pushpak Kumar Singh, Renu Deepak Khedkar, Suresh Chandra*
61	Impact of Packaging on the Shelf Life of Food Product: A Review *Tiya Bhattacharya, Monika Thakur, Rahul Lamba*
62	Preventing microbial cross-contamination in food handling: a comprehensive review Naba
63	Production and quality analysis of Spices Shouryaa Sharma*, Loveleen Sharma, Rohini Kulkarni
THEME 6 ***Harnessing Nanobiology for Agri-Food Technology***	
1	Biopolymer Based Strategy for Enhanced Survival and Controlled Release of Plant Growth-Promoting Bacteria (PGPR) Under Environmental Stress: A Way Towards Sustainable Agriculture *Shivani Mahraa, Sneha Tripathia, Kavita Tiwaria, Sobhitha Mathewa, Kritika Singha *Shivesh Sharma[1]*
2	Nanoencapsulation Of Indole-3-Acetic Acid (IAA): A Sustainable Innovation for Targeted Delivery in Agriculture To Enhance Food Security, Plant Health, And Stress Resilience *Sobhitha Mathew, Shivani Mahra, Kavita Tiwari, Sneha Tripathi, Shivesh Sharma*
3	Impact Of Salinity Stress on Wheat Production: A Growing Concern of Food Security for The Growing World Population *Vishakha Sharma, Aakriti Srivastava*
4	Zinc Nanoparticles Modulate Arsenic Absorption and ROS Scavenging, Which Are Key Components of Arsenic and NaCl-Mediated Cross Tolerance Processes in Rice *Aakriti Srivastava, Monika Thakur, Durgesh Kumar Tripathi*
5	Hydrogen Sulfide and Titanium Dioxide Nanoparticles Work to Relieve Tomato Seedlings' Stress from Salt. *Garima Balyan, Akhilesh Kumar Pandey*
6	On the NO_2 Sensing Characteristics of SnO_2 thin-film based Gas Sensors *Subham Prakash, Jasmita Mawar, Dhruvika Tyagi, O.P. Sinha, M. Senthil Kumar*
7.	Impact of copper and iron nanoparticles on photosynthetic pigments and stomatal frequency of rice plant *Pratyusha Dhal[1], Aakriti Srivastava[1,2], Durgesh Kumar Tripathi[1*]*

THEME 1
SUSTAINABLE FOOD SYSTEMS

A Comprehensive Review of Edible Cutlery: An Emerging Alternative to Single-Use Plastics

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ABSTRACT

The escalating environmental concerns associated with plastic waste have necessitated the development of eco-friendly alternatives, consequently leading to the emergence of edible cutlery. Conventional plastic cutlery requires centuries to decompose, contaminating ecosystems and releasing harmful micro-plastics into the environment. This review examines the potential of edible cutlery by synthesizing insights from various studies on its composition, functionality, and sustainability. Among the diverse materials utilized, millet-based edible cutlery is particularly noteworthy due to its nutritional profile, providing fiber, protein, and essential micronutrients. However, ensuring durability and structural integrity necessitates the use of natural binders such as xanthan gum. Researchers have analysed edible cutlery using techniques including rheological testing, Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and antioxidant studies to evaluate its mechanical strength, moisture resistance, and overall performance. Biodegradability tests confirm that edible cutlery decomposes naturally, without leaving toxic residues. Additionally, sensory evaluations aid in determining consumer acceptance based on taste, texture, and overall experience. Findings indicate that millet-based edible cutlery is not only an environmentally sustainable alternative but also a viable, nutritious option for consumers. However, challenges such as improving shelf life, affordability, and large-scale production remain to be addressed. Future research should focus on optimizing formulations, enhancing moisture resistance, and increasing consumer awareness to facilitate widespread adoption. The transition to edible cutlery represents a significant step toward reducing plastic waste while promoting sustainable and healthier choices in daily life.

Keywords: Biodegradability, edible cutlery, millet flour, single-use plastics, sustainability.

Effectiveness of Hermetic Bag for Long-Term Storage of Pearl Millet Grains

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ABSTRACT

An investigation was carried out to evaluate the effectiveness of hermetic bags for the long-term storage of pearl millet grains. The experiment was conducted with moisture levels of 10, 12, and 14% (wb) for six months. Changes in the grain temperature, moisture content, headspace gas concentration and quality characteristics has been monitored during the period at regular intervals. Polypropylene bag was taken as control. Grains stored in hermetic bags showed smaller range of temperature fluctuations. In samples with higher moisture levels, the decrease in oxygen concentration and the increase in carbon dioxide concentration were more evident. The findings also indicate that the moisture content of the grains was maintained by the hermetic bags with minimal variation. In comparison to the polypropylene bags, the germination percentage of pearl millet grains stored in hermetic bags was higher. During the storage period, the brightness value of pearl millet samples experienced a significant decrease, resulting in a darker appearance. Despite no noticeable variation in the milling characteristics of pearl millet grains during storage, these characteristics were significantly influenced by the grain moisture content at the time of milling. Hence, hermetic bags can be considered a viable option for the long-term storage of pearl millet grains.

***Keywords*:** Pearl millet, Hermetic storage, grain respiration, temperature fluctuations, grain quality.

Malting Millets: Unlocking Enhanced Bioavailability of Nutrients

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ABSTRACT

Millets, naturally rich in nutrients, possess inherent anti-nutritional factors that limit bioavailability. Malting is a bioprocessing technique that enhances the nutritional value of grains by activating enzymes and reducing anti-nutritional factors. The present study investigated the impact of varying malting durations (24-72 hours, 24±2°C) on the nutritional profile of finger millet, pearl millet, and sorghum. The research focused on optimizing malting (24-72 hours) for finger millet, pearl millet, and sorghum in enhancing nutritional profile of millet malt. Malting induced hydrolytic activity, leading to a reduction in protein (15-35%) and carbohydrate (20-40%) content, attributed to protease activation and respiratory utilization of soluble sugars, respectively. Conversely, reducing sugars increased (12-15%). This suggests that germination utilizes soluble sugars and activates proteases, improving protein bioavailability. Mineral analysis revealed a biphasic response, with an initial decrease followed by an increase in mineral content with prolonged malting. It showed an initial decrease at 24 hours, followed by an increase at 36 and 48 hours. The findings indicate that malted millet flours, rich in fiber, calcium, and iron, are promising ingredients for gluten-free extruded products due to their enhanced nutritional profile and low glycemic index. Thus, this research underscores the potential of malting to improve the nutritional quality of millets by enhancing nutrient bioavailability and reducing anti-nutritional factors, making them promising ingredients for nutrient-dense and gluten-free products.

Keywords*:* Millets, malting, nutritional profile, bioavailability, low glycaemic index, Antioxidant activity, gluten-free

Bioactive Effects of Chicory (*Cichorium intybus*)

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ABSTRACT

Cichorium intybus L. is a medicinal plant commonly known as Chicory having numerous bioactive compounds such as inulin, flavonoids, polyphenols, sesquiterpene lactones, and other phytochemicals. These components support a variety of health benefits, including hepatoprotective, antibacterial, anti-inflammatory, and antioxidant activities. Sesquiterpene lactones and inulin, a form of dietary fibre, are especially abundant in the plant's roots and give it a bitter flavour. Chicory's numerous nutritional, preventative, and medicinal properties are caused by a nutrient-rich composition including components like proteins, carbs, vitamins, minerals, soluble fibre, trace elements, and phenolic compounds found in the majority of the plant's part. Chicory leaves are rich in vitamins A, vitamin B1, vitamin B2, and vitamin C as well as minerals like calcium, potassium, and magnesium. The insulin and oligofructose present in the root of chicory function as prebiotics, encouraging the development of good gut flora, particularly Bifidobacteria. This review article explores chicory's phytochemical composition and related pharmacological characteristics, highlighting the plant's potential as a treatment for a number of chronic illnesses, such as diabetes, heart disease, and gastrointestinal disorders.

***Keywords* -** Chicory, fructooligosaccharides, inulin, sesquiterpene lactones, health promoting properties

Watermelon Seed Olegels: A Nutritional and Sustainable Alternative to Conventional Solid Fats

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ABSTRACT

Olegels have emerged as a promising alternative to conventional solid fats, offering improved nutritional properties while maintaining desirable functional characteristics. Recent studies highlight their potential for enhancing food texture, stability, and health benefits. Watermelon seed oil, a by-product of the fruit processing industry, is gaining attention due to its nutritional composition and sustainable sourcing. This paper explores the development and characterization of watermelon seed oil-based Olegels structured with various gelators, including carnauba wax, beeswax, and ethyl cellulose, while assessing their applications in food industries. Studies indicate that carnauba wax forms a firmer oleogel network, beeswax enhances spread ability, and ethyl cellulose provides stability over a wide temperature range. The application of oleogels in food products extends to bakery, confectionery, and processed foods, where they serve as healthier lipid alternatives. Their ability to mimic the texture and functionality of solid fats while reducing saturated fat content makes them valuable in product reformulation. Olegels production methods balance sustainability, scalability, and oxidative stability challenges. This study consolidates findings from recent research, emphasizing the potential of watermelon seed oil-based oleogels in structuring lipids and replacing unhealthy fats in food products. Further exploration of processing techniques and optimization strategies will enhance their industrial feasibility and consumer acceptance.

Keywords: Food texture enhancement, Oleogels, Structured lipids, Sustainable fats, Watermelon seed oil,

A Comprehensive Review on Oilseed Cakes and Their Use as Functional Foods

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ABSTRACT

This paper focuses on the study of oilseed cakes and their properties that can be utilized for their incorporation into functional foods. Oilseed cakes are the by-products of oil extraction from seeds like soybean, mustard, rapeseeds, cotton seeds, etc. They are obtained in the form of solid residue after mechanical pressing from an expeller. They are rich in nutrition and provide valuable health benefits. They have the highest content of protein followed by fibre, ash, minerals like calcium and phosphorus, phytochemicals and some trace carbohydrates or residual fat. The protein is extracted in the form of concentrates or isolates by centrifugation and precipitation. The varying composition of phytochemicals, antioxidants, anti-nutritional factors, limiting amino acids in various oilseed cakes affects the functionality of these cakes in different ways. There are various processes which can increase the nutritional value of the oil cakes like dehulling, soaking, and defatting. These processes are effective for the reduction of the anti-nutritional factors of the seeds. The full potential of oilseed cakes has not been realized yet. Their proper utilization can bring a significant change to the food and nutrition industry. Usage of cheap sources like oil cakes for functional enrichment of food and as alternative sources to animal proteins can provide a rich source of nutrition to people and thus, help in enhancing their overall health.

Keywords: Oilseed cakes, anti-nutritional factors, protein extraction, functional foods

Next-Generation Approaches to Food Waste Valorisation: Extraction, Recovery and Nano-Assisted Enhancement

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ABSTRACT

Global food waste, reaching a staggering 1.09 billion tonnes annually, necessitates a paradigm shift from mere reduction to transformative valorisation. This review explores the critical juncture where environmental challenges stemming from food waste intersect with the potential for sustainable resource recovery, emphasizing the urgent need for innovative solutions. Traditional extraction methods fall short in maximizing the recovery of valuable bioactive from diverse food waste streams, including antioxidants, dietary fibres, proteins, and colorants. To address this, the review delves into advanced "green" extraction techniques, such as ultrasound, microwave, enzymatic, and supercritical fluid extraction, which offer significantly improved efficiency and sustainability. Furthermore, the integration of nanotechnology emerges as a pivotal strategy for revolutionizing food waste valorisation. Nano-assisted innovations, including nanoencapsulation, nano emulsions, and nano adsorption, enhance the complexing, stereoisomeric stabilization, and bioavailability of bioactive compounds, unlocking a plethora of undiscovered bioactive. These advancements promise to substantially elevate the functional and commercial value of extracted compounds. By synergizing cutting-edge nanotechnology with circular economy principles and sustainable development goals, this approach not only mitigates food waste but also facilitates the production of high-value nutraceuticals and functional ingredients. This interdisciplinary approach, bridging food science, biotechnology, and nanotechnology, paves the way for the development of sustainable bioproducts and resource-efficient food systems, effectively transforming a global challenge into a valuable opportunity.

***Keywords**:* Food-waste valorisation, Nano-assisted extraction, Sustainable bioprocessing, Waste-derived bioactive.

An In-Depth Analysis of Iron-Enhanced Processed Foods Accessible on E-Commerce Platforms

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ABSTRACT

Governments of nearly all countries have developed programs and policies to fight against anaemia. However, the data depict an inevitable presence of the deficiency among almost one-third of the global population. Iron delivery by diet seems to be a workable, affordable, and long-term solution. According to numerous clinical trials, one of the best ways to prevent iron deficiency is to consume meals rich in or enriched with iron. Iron supplementation through diet, however, has shown to have minimal side effects. Therefore, scope of novel iron-rich ingredients and iron-fortified goods that are more affordable, more stable, and have a high bioavailability, is vast. Modern processing techniques open plentiful avenues to achieve more effective fortification of such food items. This review focuses on delivery of this vital micronutrient through supplementation techniques and their applicability in addressing iron needs of populations, especially the vulnerable groups. The evaluations reveal consumer perceptions, nutritional value, and market availability on online platforms, the greatest sources of iron fortification and delivery and continue to be the most widely accessible foods, including cereals, baked goods, dairy products, drinks, and condiments.

Keywords: anaemia, baked food, consumer perception, fortified foods, healthy food, iron rich, market, online availability.

Integration Of Green Processing Methods to Develop Meat Analogue from Plant Based Protein

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ABSTRACT

The growing demand for sustainable and healthy protein alternatives has led to significant advancements in plant-based meat analogues. Conventional meat production poses environmental challenges, including high greenhouse gas emissions, excessive water consumption, and land degradation. This study aims to integrate green processing methods to develop meat analogues from plant-based proteins, ensuring sustainability, enhanced nutritional value, and consumer acceptability. Green processing techniques such as high-moisture extrusion, enzymatic structuring, and fermentation were utilized to mimic the texture, taste, and functionality of conventional meat while maintaining high protein digestibility and bioavailability. Various plant protein sources, including legumes, pulses, and oilseed proteins, were explored for their techno-functional properties. The results demonstrated that optimized processing conditions significantly improved the textural attributes, sensory profile, and protein quality of the developed meat analogues. The findings suggest that green processing methods offer a viable and eco-friendly approach to producing plant-based meat alternatives with enhanced nutritional and functional properties. This research contributes to the development of sustainable food systems by reducing reliance on conventional meat production and promoting plant-based diets, aligning with global food security and environmental goals.

Keywords: eco-friendly processing, meat analogue, plant-based protein, protein digestibility, sustainability, textural attributes

Determining Oilseed Suitability: Proximate Analysis and Functional Properties for Targeted Food Applications

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ABSTRACT

This study investigates the suitability of various oilseeds for targeted food applications, with a specific focus on their potential in ketogenic diets, by examining their proximate composition and functional properties. Oilseeds represent a valuable resource for food industries due to their rich lipid content and potential nutritional benefits. However, optimal utilization, particularly in low-carbohydrate, high-fat formulations, necessitates a comprehensive understanding of their chemical composition and functional attributes. Proximate analysis, encompassing moisture, ash, protein, fat, and carbohydrate content, was conducted to establish the fundamental compositional profile of each oilseed, crucial for keto-friendly formulations. Furthermore, functional properties, including water and oil absorption capacities, emulsification and foaming properties, and antioxidant activity, were evaluated to determine their potential applications in keto-specific products. The results revealed significant variations in proximate composition and functional properties among the studied oilseeds. For instance, certain oilseeds exhibited high oil absorption capacities and low carbohydrate content, making them highly suitable for keto-friendly baked goods and snacks, while others displayed excellent emulsification properties, ideal for keto dressings and sauces. Moreover, the antioxidant activity of some oilseeds suggested their potential use as natural preservatives and functional ingredients, enhancing the nutritional profile of keto meals. Ultimately, this research underscores the importance of a thorough characterization of oilseeds to unlock their full potential in the food industry, including the growing market for ketogenic products, promoting sustainable and value-added utilization.

Keywords: Functional Properties, Ketogenic Diet, Lipid Content, Oilseeds, Proximate Analysis.

Impact Of Bio-Fertilizers on Growth, Yield and Quality of Spinach (*Spinacia Oleracea* L.)

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ABTRACT

This research assesses the effect of bio-fertilizers on spinach (*Spinacia oleracea* L.) growth, yield, and quality to encourage sustainable agriculture. The experiment was done under controlled conditions with five treatments: Farmyard Manure (FYM), Azotobacter + FYM, Azotobacter + Poultry Manure FYM, Vermicompost, and Poultry Manure + FYM. Plant height, leaf number, chlorophyll content, and total biomass were the growth parameters. measured. Statistical analysis proved Azotobacter + Poultry Manure + FYM gave the tallest plant, highest yield, and maximum chlorophyll content, reflecting its strength to improve the crop performance. The research further. elucidates how vermicompost helps. improve spinach leaf nutrient status. The literature review further provides evidence about the effectiveness of bio-fertilizers in the promotion of soil fertility and enhancement of productivity. The results show that organic fertilizers greatly improve spinach growth while fostering environmental sustainability. The use of bio-fertilizers can contribute to enhanced agricultural productivity, chemical input reduction, and improved soil fertility management. These findings confirm the need for incorporating bio-fertilizers in contemporary agronomic practices to facilitate increased yields with minimal ecological footprints.

Keywords: bio-fertilizers, spinach, farmyard manure, azotobacter, poultry manure

The Nutritional Composition of Red Algae Species Highlights Their Potential Application in The Transition to Sustainable Functional Food Systems.

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ABSTRACT

Red algae (Rhodophyta) are ancient photosynthetic organisms characterized by their reddish pigmentation, attributed to phycobiliproteins and carotenoids (1–3). These pigments confer important biological properties, such as antioxidant, anti-inflammatory, neuroprotective, and anticarcinogenic potential. These bioactive substances have promising applications in functional foods and nutraceuticals, in line with the increasing demand for natural ingredients in the food industry (4). Consequently, red algae are being explored for their potential in the development of innovative products that take advantage of their health benefits and bioactive properties (5). This study examines the nutritional composition of three red algae species (*Gigartina pistillata*, *Mastocarpus stellatus*, and *Chondrus crispus*) highlighting their high carbohydrate (48-58% dry weight) and protein content (14-25% dry weight), with low lipid levels (1.7-2.4% dry weight). *C. crispus* exhibited the highest protein content (24.7%), positioning it as a promising dietary protein source. The fatty acid profile revealed a predominance of saturated fatty acids, primarily palmitic acid (28-44%), alongside a significant presence of omega-3 fatty acids (22-29%). Lysine was the most abundant essential amino acid, reaching 46% in *M. stellatus*. These findings highlight the nutritional potential of red algae in functional foods and nutraceuticals, supporting the development of nutrient-dense, eco-friendly products. Therefore, by harnessing these bioactive compounds, the food industry can promote health while advancing sustainable food systems, enhancing food quality and aligning with environmentally responsible production and consumption practices.

Keywords: *Gigartina pistillata*; *Mastocarpus stellatus; Chondrus crispus; nutritional composition; sustainable foods.*

Food Losses and Wastage within the Food Supply Chain; Connecting the Dots with Sustainable Food System: An Overview

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ABSTRACT

Human beings as consumers have a huge responsibility towards their planet Earth to maintain and balance its natural resources. Food losses and wastage is a Global issue faced today. It indicates that not only are we depleting our resources unnecessarily but also making it difficult for the upcoming generations to survive. The food resources that could have otherwise been saved for future generations are now being wasted. To prevent such avoidable losses and move towards a sustainable food system nationally and globally, we as consumers need to change our behavior towards food losses and wastage by understanding the core areas of these losses and depletion. The role of consumers in Food Supply Chain should be to understand the increase knowledge of distribution and consumption of suboptimal food and contribute towards a sustainable food system. This paper aims to understand the challenges faced by the people in achieving sustainable food system focusing on food losses and wastage and its management.

Keywords: Food supply chain, food waste, suboptimal food, sustainable food system

Cellulose-Based Food Packaging Materials from Fruit Processing Byproducts

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ABSTRACT

There are recent advances in the development of sustainable food packaging materials derived from cellulose-rich fruit processing byproducts. The global fruit processing industry generates millions of tons of waste annually, including peels, pomace, seeds, and stems, which represent an underutilized resource with significant cellulose content. High-quality cellulose fibers, microfibrillated cellulose, and cellulose nanocrystals can be isolated from various fruit wastes by various extraction methods like alkaline treatment, acid hydrolysis, and enzymatic processes. These extracted cellulosic materials have been successfully transformed into films, sheets, molded containers, and composite materials with promising mechanical, barrier, and antimicrobial properties. Recent developments in this area includes nanocellulose-reinforced films from citrus peels which shows oxygen barrier properties comparable to conventional plastics, and apple pomace-derived composites with enhanced biodegradability. The present review discusses the use of fruit processing by-products for producing cellulose-based biopolymers as an alternative to synthetic plastic polymers, extraction techniques and the application of these biopolymers as value-added functional packaging films and coatings.

Keywords: Fruit processing byproducts, Cellulose extraction, Biodegradable packaging, sustainable materials

Emulgel-Based Edible Oleofilms: Innovative Functional Packaging for Foods

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ABSTRACT

The food industry is increasingly seeking sustainable packaging solutions to enhance food quality and shelf life. Emulgel-based edible oleofilms, combining the properties of emulsions and gels, offer a promising approach. These films are created by stabilizing an emulsion within a gel matrix, enhanced with plasticizers to improve film-forming capabilities. The resulting films exhibit desirable physical, chemical, and mechanical properties, making them suitable for controlled release of bioactive compounds. This makes them ideal for sustainable packaging and bioactive delivery, enhancing both sensory and nutritional qualities of food. Potential applications include edible packaging, confectionery, bakery products, and fat replacement in various food items. Emulgel-based oleofilms provide a biodegradable and non-toxic alternative to traditional packaging materials, contributing to reduced environmental impact and aligning with sustainable packaging goals. By leveraging these innovative films, the food industry can address consumer demands for eco-friendly packaging while maintaining product freshness and quality. Like other edible films, such as plant-based and alginate-based coatings, emulgel-based oleofilms can improve barrier properties and extend shelf life by reducing moisture and oxygen permeability. The integration of bioactive compounds can further enhance antimicrobial and antioxidant properties, ensuring safer and healthier food products. This paper explores the development and applications of emulgel-based edible oleofilms, highlighting their potential to transform the food packaging landscape with sustainable and innovative solutions.

***Keywords**:* bioactive delivery, biodegradable, emulgel oleofilm, edible packaging, sustainability

Characterization And Evaluation of Biodegradable Films Based on Cellulose Microfibers of Cow Pea and Field Bean Pods

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ABSTRACT

Advancements in food processing industry raise concern over the increase in the byproducts and food waste as a negative environmental and economic effect, which highlights the immediate need for its management to minimize waste accumulation and increase waste valorization. The food processing waste has gained attention as a sustainable source for biodegradable packaging. The current study is aimed at the feasibility of extracting cellulose microfibers from field bean and cowpea pods by using alkaline extraction method and their utilization. CMF of samples was utilized in developing biodegradable films by modifying the composition of standard corn starch films by solvent casting method. These developed biodegradable films were characterized by Thermogravimetric analysis, Differential scanning calorimetry and X-Ray Diffraction analysis. The developed films were further tested for biodegradability, swelling capacity, anti-permeability of an oil, water vapour transmission rate and transparency rate (colour). The present study proves that CMF of field bean and cow pea pods can be used in developing alternative biodegradable plastics.

Keywords: Cellulose microfibers, cowpea pods, field bean pods, biodegradable films, Bio-packaging.

Development Of Biodegradable Cups from Corn and Fruit Processing Waste and Its Characterization

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ABSTRACT

The present study aims to development of biodegradable cups from corn and fruit processing waste. Optimization of raw material level i.e. corn cob, mango peel and pineapple peel were carried out using response surface methodology. The Independent variables were corn cob (20-40g), mango peel (30-50g) and pineapple peel (20-30g), while the responses used for the optimization were hardness, colour (L* value) and water holding capacity. Second order polynomial equation was used for fitting the model. Optimal product characteristics were obtained at the optimal ingredient level as corn cob powder (34g), mango peel powder (40g) and pineapple peel powder (26g) having maximum hardness (2.456kg), L* value (47.15) and water holding capacity of (18.39min). The study also examines physical properties, functional group analysis, morphological characteristics and biodegradability of developed cup sample. Soil burial test showed prepared samples were degraded within 30 days. This research work demonstrates the effective solution for utilization of processing waste and development of ecofriendly cups which are alternative to single used plastic tableware.

***Keywords**:* Biodegradable cups, Ecofriendly, Optimization, Processing waste, Response surface methodology,

Effect of Organic Manures on Growth of Cabbage

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ABSTRACT

Organic manures play a crucial role in enhancing soil fertility, microbial activity, and healthy cabbage (Brassica oleracea var. capitata) growth. In contrast to chemical fertilizers, organic amendments release nutrients slowly and continuously, enhancing plant strength while preserving soil health. This research assesses the impact of various organic manures, such as farmyard manure (FYM), vermicompost, poultry manure, and Azotobacter, on cabbage vegetative growth. Organic manures improve soil structure, enhance microbial diversity, and increase nutrient availability, which all work together to enhance plant growth. Field experiments were also performed to evaluate the major growth parameters like plant height, leaf number, leaf area, and head diameter under varying organic treatments. The findings indicated that organic manure-treated plants had significantly enhanced vegetative growth than control plants. Furthermore, Azotobacter, a free-living nitrogen-fixing bacterium, was responsible for increasing root development and nutrient uptake, contributing further to the improvement in plant health. Soil analysis showed organic matter content, microbial biomass, and nutrient availability in manure-amended plots increased, illustrating long-term organic amendment effects on soil health. The research emphasizes the use of organic manures as sustainable substitutes for synthetic fertilizers to improve cabbage growth. Their capacity to enhance soil fertility and support plant growth makes them a good choice for environmentally friendly agriculture. Organic farming practices can guarantee sustainable cabbage production with decreased environmental effects, maintaining soil fertility, and supporting long-term agricultural sustainability.

***Keywords**:* Organic manure, vermicompost, poultry manure, Azotobacter, sustainable agriculture.

The Formulation of Nutritious Vegan Burger Patty Incorporating with Millet: A Better Plant-Based Substitute

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ABSTRACT

The nutrient-dense grains proso millet (*Panicum milliaceum*) and foxtail millet (*Setaria italica*) are cultivated sustainably in India's arid regions. With the rising demand for millet-based food products, this study aimed to formulate a nutrient-dense vegan burger patty incorporating proso and foxtail millet to promote consumption and establish these grains as reliable sources of energy and essential minerals. A great alternative for white potato-based patty can be develope by the addition of sweet potato (Ipomoea batatas) with millet, which has higher fiber and vitamin A content. Proso and foxtail millet were combined with sweet potato, garlic, onion, salt, and oil to formulate the burger patty. Four variations of burger patties were prepared and evaluated for acceptability using a 9-point hedonic scale by 12 expert panellists. The results revealed that sample S3, consisting of 15% proso millet, 15% foxtail millet, and 70% sweet potato, achieved higher overall acceptance scores compared to other samples: S1 (50% sweet potato, 25% foxtail millet, 25% proso millet), S2 (60% sweet potato, 20% foxtail millet, 20% proso millet), and S4 (80% sweet potato, 10% proso millet, 10% foxtail millet). The finding suggested that sample S3 has better sensory qualities. In conclusion, by formulating a nutritious burger patty incorporated with millet, this study provides a healthy substitute for the less nutritious burger patties that are currently available on the market. It encourages better dietary habits and enhances the advantages of including nutrient-rich ingredients in regular dietary selections by offering a quick and healthy option.

Keywords: Burger-patty, Foxtail millet, Proso millet, Sweet potato, Vegan.

Urban Agriculture as A Catalyst for Sustainable Food Systems: Enhancing Dietary Diversity and Food Security in Urban Areas

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ABSTRACT

Urbanization is a rapidly growing phenomenon, with 68% of the global population expected to reside in cities by 2050. This expansion increases food demand, projected to rise by 70% by 2050, raising concerns about food and nutritional security, especially in developing regions where diets often lack diversity and essential nutrients. Urban agriculture has emerged as a transformative strategy for building sustainable food systems, offering localized solutions to enhance food security, dietary diversity, and resilience in urban areas. By cultivating fresh locally produced food, urban agriculture reduces dependency on long supply chains, reduces food miles, and promotes resource efficient practices, contributing to environmental sustainability and climate resilience. In rapidly urbanizing regions worldwide, urban agriculture holds significant potential to address food system challenges. It provides a pathway to diversify food sources, improve access to nutritious food and reduce pressure on shrinking cultivable land. This study examines urban agriculture practices, motivations, and perceptions of urban residents regarding urban agriculture alongside its impact on dietary diversity. A descriptive research design will be used, and data will be collected from both practitioners and non- practitioners of urban agriculture through mixed-method approach combining structured interviews and quantitative analysis. Findings and insights from this paper can inform targeted interventions and policies, promoting sustainable urban agriculture to build resilient food systems and improve nutrition in urban communities. ensuring food security. By aligning with the global agenda, this research contributes to the discourse on how localized food production can transform urban food systems ensuring environmental sustainability for future generations.

KEYWORDS: Climate resilience, food security, localized solutions, mixed- method, nutritional security, resource-efficient practices, sustainable practices, urban agriculture

Evaluation of Red Macroalgae as Biomass Feedstock For Biofuel Production

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ABSTRACT

Energy consumption is particularly vulnerable to climate change, with rising global demand, dwindling fossil fuel reserves, inflated oil prices, and environmental concerns from greenhouse gas emissions driving the search for renewable energy source. Algae have emerged as a strong candidate for bio-renewable energy due to their rapid growth, economic credibility, and non-competition with agricultural land. However, compared to microalgae, research on macroalgae as biofuel feedstocks is still in the early stages of large-scale economic application. In this study, the macro-, micro-, and elemental composition of three red macroalgae species from Gigartinales order were evaluated to assess their potential as biomass feedstocks for biofuel production. Thermogravimetric and proximate analysis revealed high volatile matter content in all samples (above 60%), with Mastocarpus stellatus exhibiting the highest at 66.4%. Additionally, the higher heating value (HHV) reached 19.97 MJ/kg in M. stellatus, indicating a superior energy potential. These macroalgae demonstrated high concentrations of key elements such as potassium (K) and magnesium (Mg), essential for efficient enzymatic fermentation processes. The carbon content (27-33%) and moderate nitrogen levels (2-4%) further suggest their suitability for bioethanol production, highlighting their potential as sustainable biomass feedstocks for biofuel applications. In conclusion, macroalgae show promise for biofuels, but their production requires optimization to achieve economic and environmental sustainability. Solutions such as LED systems, wastewater recycling, and bioflocculation can improve harvesting efficiency. Algae-based biofuels are commercially viable, and scaling up their production could yield significant socio-economic benefits.

Keywords: Red macroalgae; Biofuel production; Thermogravimetric and proximate analyses; Energy Sustainability

Utilizing Agro-Waste for Sustainable Methylcellulose Production

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ABSTRACT

The growing demand for sustainable and biodegradable food ingredients has spurred interest in plant-derived hydrocolloids. Methylcellulose, a widely used food additive, is a stabilizer, thickener, emulsifier, and gelling agent, with applications in dairy products, baked goods, plant-based meat alternatives, and gluten-free items. Traditionally, methylcellulose is made from wood cellulose; however, agricultural biomass offers an eco-friendly alternative. This study explores the use of corn biomass as a renewable resource. Cellulosic residue was extracted through alkalization and etherified with dimethyl sulfate to create water-soluble methylcellulose. Fourier-transform infrared spectroscopy confirmed the successful addition of methyl groups on the cellulose backbone. The methylcellulose exhibited shear-thinning behaviour, indicating its potential as a functional hydrocolloid in food systems. Transforming agricultural biomass into valuable food ingredients adheres to sustainable processing principles and the circular bioeconomy, aiming to decrease dependence on conventional forestry resources. This innovative approach utilizes agricultural byproducts, enhances environmental sustainability, and broadens the food industry's offerings of functional ingredients.

Keywords: Agro-waste, corn biomass, methylcellulose, food applications, circular bioeconomy.

Plant-Based Proteins: Drivers and Barriers To Future Food Diets To Reduce Meat Over-Consumption

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ABSTRACT

The demand for animal protein is rapidly increasing and meat production has doubled from 1988 to 2018. It is projected to reach a peak of 570 million tons by 2050. Meat and dairy production currently account for 83% of agricultural land use and 60% of greenhouse gas emissions, but provide only 18% of calories and 37% of protein. If everyone were to adopt a high-meat diet, the planet could only sustain 2.5 billion people. This unsustainable consumption contributes to resource depletion and biodiversity loss. Additionally, overconsumption of meat, particularly red meats, can pose health risks, and the overuse of antibiotics in livestock farming contributes to antimicrobial resistance, which could cause more deaths than cancer by 2050. Faced with these challenges, it is becoming imperative to make plant-based protein alternatives sharper. Plant-based proteins can mimic the organoleptic characteristics of animal proteins and thus meet the preferences of today's consumers, in addition to offering a healthier and sustainable nutritional profile. They require fewer resources and contribute to lower emissions. However, barriers such as consumer acceptance, high costs, and uncertainties about long-term health effects limit its widespread adoption. The present communication tries to open this outlook to create strong scientific, industrial, and commercial links to have a comprehensive spectrum, and to sensitize consumers to the basic issues so that they can acquire a critical attitude towards the matter.

Keywords: Cell-based meat, Future foods, Meat over-consumption, Plant-based protein

Industry 5.0 Innovations for Waste Management and Circular Economy in Sustainable Food systems: A systematic review

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ABSTRACT

The transformation of sustainable food systems demands innovative waste management approaches and circular economy practices. The adoption of Industry 5.0 technologies contributes towards aligning with the recent advancements for sustainable food systems. Industry 5.0, characterized by human-centric automation, artificial intelligence (AI), Internet of Things (IoT), and advanced robotics, extends impactful solutions to enhance efficiency, reduce waste, and promote sustainability in food supply chains. This systematic review delves the role of Industry 5.0 technologies in optimizing waste management and fostering circular economy principles within the food sector. The study synthesizes cutting-edge technologies, focusing on smart waste monitoring, precision resource recovery, AI-driven food waste reduction, and blockchain-enabled traceability, cloud computing and 3D-printing of food waste recovery to valuable edible products. Findings indicate that collaboration of Industry 5.0 innovations can significantly minimize food loss, enhance upcycling and valorization of by-products, and support sustainable production-consumption loops. However, challenges to tackle include high implementation costs, regulatory barriers, and technological adoption gaps persist. Future research should manage the policy frameworks, scalable solutions, and cross-sectoral collaboration to maximize the potential of Industry 5.0 in achieving sustainable food systems.

Keywords: Circular economy, Industry 5.0, sustainable, valorization, waste management

Impact Of Sustainable Practice on Spinach Production

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ABSTRACT

Spinach production has been greatly impacted by sustainable agricultural practices since they increase output, improve soil health, and lessen their negative effects on the environment. The long-term sustainability of spinach production has been aided by the incorporation of eco-friendly insect control techniques, effective water management, and organic farming methods. By adding vital nutrients to the soil, organic fertilizers like compost and manure encourage healthy plant development while reducing chemical runoff. Crop rotation and conservation tillage also lessen reliance on artificial inputs, preserve soil fertility, and stop erosion. Consistent spinach production is ensured by water-efficient irrigation methods, including drip irrigation and rainwater harvesting, which maximize water consumption and lessen the effects of drought. Additionally, integrated pest management (IPM) and biological pest control lessen the need for chemical pesticides, lowering health hazards and protecting biodiversity. By guaranteeing consistent and robust production, these sustainable methods not only improve the quality of spinach but also support food security. Additionally, sustainable farming methods reduce greenhouse gas emissions linked to traditional farming, aiding in the fight against climate change. Reduced input costs and higher consumer demand for spinach cultivated organically also have positive economic effects. However, obstacles like increased labor costs and the upfront expenses of switching to sustainable farming could prevent widespread adoption. Notwithstanding these challenges, sustainability in spinach production has more long-term advantages than disadvantages, making it an essential tactic for both economically and environmentally sound farming. A transition to sustainable spinach farming can be facilitated by raising awareness and offering farmers assistance, guaranteeing a balance between economic stability, environmental preservation, and productivity.

Keywords: Sustainable agriculture, spinach production, soil health, water management, integrated pest management.

Effects Of Different Drying Techniques on The Composition of Mango Leaves Powder and Their Utilization as Nutritive Food Colour

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ABSTRACT

Mango leaves (*Mangifera indica*) have been widely recognized for their medicinal and nutritional properties due to their rich bioactive components, including mangiferin, flavonoids, and phenolic acids. These leaves offer various health benefits such as antioxidant, anti-inflammatory, antibacterial, and antihyperglycemic properties. However, the drying process significantly influences the preservation of these bioactive compounds, impacting the overall quality of mango leaf powder. This study aims to evaluate the effects of different drying techniques—air drying, oven drying, freeze drying, solar drying, and microwave drying—on the physical, functional, and physio-chemical characteristics of dried mango leaves. The methodology involves collecting fresh mango leaves, subjecting them to various drying treatments, and analyzing the resulting powders for water and oil absorption capacity, solubility, and swelling index. Additionally, proximate analysis will be conducted to assess moisture, ash, protein, fat, and carbohydrate content, along with pH measurement, total phenolic content evaluation, and bioactive compound profiling using GC-MS. Statistical analysis, including ANOVA, will determine the most effective drying method in terms of nutrient retention, economic feasibility, and energy efficiency. The study is expected to identify the optimal drying technique that maximizes nutrient and bioactive compound retention while ensuring prolonged shelf life. However, certain limitations include prolonged drying time for sun drying, microbial contamination risks, and potential pigment alterations in oven drying. The findings will contribute to optimizing drying methods for mango leaves, enhancing their applications in functional foods and herbal formulations.

Keywords: Mango leaves, Drying techniques, Bioactive compounds, Antioxidant properties, Functional food

Effects of Different Drying Techniques on the Composition of Giloy Leaf Powder and Their Utilization as a Nutritive Food Colour

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ABSTRACT

Tinospora cordifolia, also referred to as Guduchi or Giloy, is a medicinal plant that has been extensively used in Ayurveda because of its multifaceted therapeutic potential. The leaves, stem, and roots of the plant are used in conventional and contemporary medicine for their immunomodulatory, anti-inflammatory, antioxidant, hepatoprotective, and anti-diabetic activities. However, drying procedures are crucial for the bioactive composition and pharmaceutical activity of powders derived from plants. The present study attempts to contrast the effect of different drying methods on chemical and functional characteristics of Tinospora cordifolia leaf powder and its applicability towards value-added products. Leaves in fresh condition will be treated using various drying procedures, then evaluated for physical and functional attributes, such as water and oil absorption capacity, solubility, and swelling index. Further, the physio-chemical characteristics, like proximate composition, pH, and total phenol content, will be investigated. Statistical comparison by ANOVA will be employed to assess the effect of drying processes on these parameters. The results will help in maximizing drying methods to maintain the bioactive compounds and to increase the utility of Tinospora cordifolia in pharmaceutical and nutraceutical formulations.

Keywords: Giloy leaf powder, Drying techniques, Bioactive compounds, Antioxidant properties, Functional food

Physiochemical Characterization of Dried Bamboo Leaf Powder and Its Utilization in The Development of Value-Added Products.

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ABSTRACT

Bamboo is a very rich and versatile natural resource with great potential for value-added uses. Even though bamboo has a rich chemical composition and fiber content, it is underutilized in most industries. In this research, the physiochemical properties of dried bamboo leaf powder and its possible use in food products were investigated. Bamboo leaves were sourced, oven-dried, and milled into powder, which was added to a baked item, namely cookies, at different levels. Physiochemical characteristics of the powder from dried leaves and the finished product were determined, namely moisture content, protein, fat, ash constitution, and sensory characteristics, according to A.O.A.C. standard procedures. Bamboo leaves contain bioactive molecules in the form of phenolics and flavonoids, providing antioxidant and functionality to make them match increasing trends towards health-focused and sustainable food production. Additionally, the powder of bamboo leaf holds prospective usage in nutraceuticals, biopacking materials, and sustainable product production. Few research works, though, are carried out regarding the value addition in dried powder of bamboo leaves incorporated into food. With enhanced process technologies and considering quality traits, the current work aims at optimizing the market readiness of bamboo food products. Results corroborate the sustainability of bamboo leaves as a potential substitute for traditional ingredients and as a means towards environmental and economic sustainability. More research in the future must prioritize the expansion of uses of bamboo in food and bioproduct industries, optimization of processing and consumer acceptance challenges.

Keywords: bamboo leaf powder, protein, antioxidant, flavonoids

Potential Role of Purple Yam in Gut Microbiota Modulation: A Comprehensive Review

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ABSTRACT

Purple Yam (*Dioscorea alata*) is a nutrient-rich tuber with potential benefits for gut health due to its unique nutritional composition, including anthocyanins and dietary fibre. The gut microbiota plays a crucial role in digestion, immune function, and metabolism, and dysbiosis has been linked to various diseases. Purple yam's prebiotic potential, derived from its fibre content and fermentation capabilities, suggests it may beneficially influence microbial diversity and promote gut health. Anthocyanins and polyphenols present in purple yam also offer antioxidant and anti-inflammatory effects, further supporting its role in modulating the gut microbiota. Several studies, including clinical trials and animal research, indicate that purple yam can improve gut health by supporting beneficial bacterial populations and reducing pathogenic bacteria. Furthermore, purple yam may have therapeutic potential in conditions like inflammatory bowel diseases, obesity, and metabolic disorders. While research shows promising results, challenges remain, including variability in study outcomes and the need for further investigation into long-term effects. Future research should explore the broader implications of purple yam in gut health, its clinical applications, and its potential in functional foods to prevent and manage health issues linked to gut microbiota imbalance. Its significance lies in offering a natural dietary approach to enhance gut health and prevent related disorders.

Keywords: Purple Yam, Gut Microbiota, Functional foods, Gut health, Anthocyanins

Exploring The Role of Mustard Seed Meal as A Potential and Sustainable Food Ingredient: A Comprehensive Review

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ABSTRACT

Mustard seed meal, a byproduct of mustard oil extraction, is gaining recognition as a potential and sustainable food ingredient due to its valuable bioactive components. Studies have identified the antimicrobial and preservative qualities of compounds extracted from mustard seed meal, like sinapic acid, which is effective against bacteria such as *Staphylococcus aureus*, *E. coli,* and *Listeria monocytogenes*. Mustard seeds are generally rich in polyunsaturated fatty acids and antioxidants, increasing their popularity as a natural ingredient in the food industry. Research is focused on improving sinapine extraction from mustard seed meal, highlighting its antioxidant, antibacterial, and UV-filtering properties. Even though mustard seed meal contains antinutritional factors like glucosinolates and erucic acid, current efforts are being made and are focused on reducing these components to improve its suitability, especially for its inclusion in not only animal diets but in human diets as well. Furthermore, mustard seed meal along with its extracts are currently being explored for uses such as improving soil health, reducing pesticide use, and serving as a biofumigant. Different types of mustard seed meals, including brown, black, and white, vary in crude protein, moisture, and sinapine content thus impacting their functional properties. Mustard seed meal appears to be a promising sustainable ingredient that can enhance food products and promote environmental sustainability, making them crucial for the future of the food industry.

Keywords: mustard meal, sinapine, sustainable, antioxidant, antinutritional.

Current Innovations in the Food and Nutraceutical Applications of Millets

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ABSTRACT

People's eating habits have changed significantly in the last few years. Nowadays, consumers look for food products that are nutritious and healthy in addition to being convenient. The rising awareness of nutrition and its vital role in general health and well-being has led to the resurgence of interest in small-seeded grains known as millets. They are also known as “nutri-cereals” and are gaining a lot of recognition for their rich nutritional profile, environmental sustainability and their ability to alleviate food security and malnutrition. Furthermore, they are gluten-free, highly versatile and have a low glycaemic index making them suitable for diabetics. Increasing the cultivation of these ancient grains has several benefits including nutritional security, climate resilience and economic empowerment for small and marginal farmers. The recent efforts by the government have popularised these nutri cereals but due to the limitations in their processing, they are still underutilized and have limited consumption. This article delves into the current innovations in the food and nutraceutical applications of millets including the formulation of novel convenience food products, extraction and isolation of bioactive components and their applications in functional food development, gluten-free dietary supplements and targeted health products. These latest advancements in millets make them a promising candidate in improving human health and overall well-being. Future research and development activities should focus on converting these prominent findings into consumer-friendly products that fit well into their contemporary lifestyles.

Keywords: functional food, gluten-free, glycaemic index, millets, nutraceuticals

Corncob Cellulosic Residue Etherified to Water Soluble Hydroxypropyl Cellulose

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ABSTRACT

Among several natural polysaccharides, guar gum, xanthan, gellan, carrageenans, pectin, and hydroxypropyl cellulose are explored in food, textiles, cosmetics, and pharmaceutical industries. However, the low production cost, readily available, highly soluble, non-toxicity, thickening, and stabilizing properties of hydroxypropyl cellulose make it a favourable choice. It is used extensively in sauces, canned foods, frozen foods, and dairy products. Cellulose from trees and forests is the primary source of hydroxypropyl cellulose. However, these natural resources aid immensely in reducing the impact of climate change. Furthermore, the scientific and industrial communities are transitioning towards sustainability, emphasizing an environmentally friendly, clean, and green outlook. In this regard, cellulosic residue from renewable agricultural residues offers sustainable opportunities. Herein, corncob cellulosic residue was alkalized and etherified with propylene oxide to make water-soluble hydroxypropyl cellulose. FTIR analysis confirmed the presence of the hydroxypropyl groups on the cellulosic residue. The viscosity of hydroxypropyl cellulose solution decreases with increased shear rate, suggesting the shear-thinning behavior. The outcome opens novel opportunities for hydroxypropyl cellulose derived from agriculture biomass and agricultural byproducts in food and non-food applications and contributes to the circular bioeconomy.

Keywords: Corncob cellulosic residue, alkalized, etherified, shear-thinning

Evaluation Of Functional and Physicochemical Properties of Black Wheat and Comparing Effect of Processing on Anthocyanin Retention

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ABSTRACT

This study evaluated the physicochemical and functional properties of black wheat flour (BWF) and its application in product development. Two food products, bread (high processing temperature) and ladoos (low processing temperature), were formulated using different proportions of BWF (25% and 50%). The effects of processing temperature on anthocyanin retention, sensory acceptability, and textural properties were analyzed. Physicochemical analysis of BWF revealed moisture content of 9.4%, ash 1.93%, protein 18.09%, fat 1.57%, wet gluten 17.3%, dry gluten 8%, bulk density 0.67 g/mL, water absorption capacity 83.76%, and alcoholic acidity 0.14%. The initial anthocyanin content of BWF was 8.2 mg/100 g, which decreased in processed products. Anthocyanin content in 25% and 50% BWF ladoos was 1.17 mg/100 g and 2.62 mg/100 g, respectively, while in bread, it was 1.15 mg/100 g and 2.52 mg/100 g. The percentage loss of anthocyanins was comparable within ladoo and bread formulations, while losses in both products were significantly higher compared to raw BWF, indicating processing-induced anthocyanin degradation irrespective of thermal intensity. Sensory evaluation indicated that 25% and 50% BWF formulations were the most acceptable. The acceptability of 25% BWF bread was 50%, while 50% BWF bread had 20% acceptability. Similarly, 25% BWF ladoo had 33.3% acceptability, and 50% BWF ladoo had 23.3%. Texture profile analysis of BWF-based breads showed that hardness, cohesiveness, and springiness were comparable to the refined wheat flour control, suggesting similar textural properties.

Keywords: Functional food, Anthocyanins, texture profile analysis, Ladoo, Bread.

High Procurement Rates and Their Impact on Sustainable Agriculture: Evidence from Three States Shaped by The Green Revolution

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ABSTRACT

The role of agricultural policies, particularly the Minimum Support Price (MSP), in shaping the economic stability and sustainability of farmers in India remains a crucial area of research in economics. Studies on agricultural productivity in India have largely focused on state-level disparities in productivity, stemming from variations in inputs such as fertilizer use, cropping intensity, and irrigation. However, the institutional inefficiencies driving these disparities, particularly the role of procurement rates, have not been sufficiently addressed. The MSP, while designed to protect farmers from the volatility of market prices, has not been uniformly successful across states, with noticeable variations in procurement rates among regions. These disparities are, in part, linked to the efficacy of the procurement apparatus established by state governments. This study examines the contrasting procurement practices in Punjab, Uttar Pradesh, and Haryana; three states heavily impacted by the Green Revolution. The study argues that the differences in procurement rates between these states contribute significantly to variations from other states in agricultural wages, indebtedness, land irrigation, and cropping intensity, and spell grave concerns for sustainability in these regions. In particular, the study argues that higher procurement rates are correlated with decreasing crop diversity. Additionally, the study uses indices to assess the extent of crop diversity in these states, finding that the dominance of MSP-supported crops raises concerns about long-term agricultural sustainability. While Punjab benefits from being a major recipient of MSP interventions, its agricultural model, which has fostered wealth among farmers, raises important questions about the environmental and economic sustainability of such a focused, high-input agricultural system. This paper highlights the need for further research into shifting away from MSP policies to balance farmer economic stability with environmental sustainability goals, using methods that boost entrepreneurship and technology diffusion, particularly in regions historically shaped by the Green Revolution.

Keywords: Sustainability, Minimum Support Price, Green Revolution, Crop Diversity, Monoculture

Assessing The Carbon Footprint and Sustainability Index of Indian Agriculture

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ABSTRACT

Agriculture is the backbone of India's economy, employing 45.76% of the workforce in 2022-2023. The intensification of agricultural practices following the Green Revolution has led to a rise in greenhouse gas (GHG) emissions, particularly from fertilizer use, irrigation and crop residue burning and representing around 13.5% of total human-caused emissions. With a growing population, there is increasing demand for food security so adopting sustainable agriculture practices is essential to ensure long-term productivity while minimizing environmental impact. The paper analyzes the carbon footprint of major crops in India and assessing their sustainability through a carbon-use efficiency framework. The study utilizes a structured approach, including input-output evaluations, emission factor computations, and trend analysis to assess CF at both per-hectare and overall scales. Moreover, a sustainability index is created to assess the environmental effectiveness of various cropping systems. The sustainability index, derived from carbon input-output relationships, suggests that current farming practices are increasingly unsustainable due to soil degradation, declining fertilizer efficiency, groundwater depletion, and emissions. This study fills a significant research void by offering a comprehensive analysis of agricultural emissions over different times, enabling data-informed policy suggestions for sustainable crop cultivation. The results are anticipated to aid in fostering climate-resilient farming methods and enhanced resource efficiency, furthering India's sustainability objectives in the long run.

Keywords: Sustainable Agriculture, Sustainability Index, Carbon Footprint, Greenhouse Gas Emissions, Agriculture Input

Sustainable Innovation in Functional Foods: Development of Iron-Rich Jam using Palmyra Jaggery (Borassus Flabellifer)

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ABSTRACT

Sustainable food systems emphasize nutrient-rich, eco-friendly alternatives to processed foods. Palmyra jaggery (Borassus flabellifer), a minimally processed, iron-rich natural sweetener, serves as a sustainable substitute for refined sugar. Unlike sugarcane, which requires excessive water and depletes soil, palm trees conserve water, improve soil fertility, and grow without deforestation. This study develops an iron-rich jam using Palmyra jaggery and evaluates its sensory properties, total soluble solids (TSS), moisture content, and shelf-life stability over four months. Jams were formulated with varying Palmyra jaggery proportions. A nine-point hedonic scale assessed taste, texture, aroma, and color. TSS and moisture content were analyzed, and shelf life was monitored under refrigerated conditions. Results showed high sensory acceptability, with minimal texture hardening and slight color darkening over time. Stability analyses confirmed a four-month shelf life without preservatives. Palmyra jaggery enhances nutritional value, sustainability, and economic feasibility by reducing dependence on resource-intensive sweeteners. Standardizing processing methods can further improve quality, reduce spoilage, and support farmer livelihoods. This study underscores the potential of Palmyra jaggery in commercial functional food production, supporting sustainable agriculture and providing an iron-rich alternative to conventional jams for health-conscious consumers.

Keywords: Iron-rich jam, Palmyra jaggery, Sensory evaluation, Shelf-life stability, Sustainable food system

Chlorine Free Nanocellulose Based Rice Husk Edible Coating On Kale Leaves: Approach Towards Circular Economy

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ABSTRACT

Industrial rice produces a large amount of lignocellulosic biomass, but much of it remains unused. Researchers explored an eco-friendly, chlorine-free method to extract nanocellulose from rice husks. The extraction process resulted in a nanocellulose yield of 71.32%, which was higher than the 53.32% yield obtained using the standard method. SEM images revealed noticeable microstructural changes in the rice husk at each treatment stage. XRD analysis showed an increase in crystallinity from raw rice husk to nanocellulose. Additionally, an edible coating was developed using the extracted nanocellulose. Nanocellulose based edible coating was formulated. Response surface methodology was used to optimize RHN concentration (1-5%), Tween 80 concentration (0.1-0.5%) and glycerol concentration (5-15%). The optimum values of RHN concentration, Tween 80 concentration and glycerol concentration were: 3%, 0.3% and 10%, respectively. Under the optimized coating conditions, contact angle, surface tension and turbidity were: 30.12º, 26.39 mN/m and 166.83 NTU, respectively. Rheological study revealed shear thinning property of the coating solution. The optimized coating solution was coated on kale leaves and various properties were measured for comparison of coated Kale leaves with uncoated ones. PLW, Lightness, Hue angle, chlorophyll, respiration rate for 15 days storage of uncoated kale leaves varied from 0 to 42.23%, 34.01 to 65.67, 127.25 to 101.22º, 55.04 to 5.14 SPAD unit, 17.03 to 89.33 $mL.CO_2kg^{-1}h^{-1}$, respectively. PLW, Lightness, Hue angle, chlorophyll, respiration rate for 15 days storage of coated kale leaves varied from 0 to 19.36%, 33.27 to 45.12, 127.76 to 116.54º, 55.06 to 28.74 SPAD unit, 6.02 to 54.27 $mL.CO_2kg^{-1}h^{-1}$, respectively.

***Keywords*:** Rice husk, chlorine free method, nanocellulose based edible coating, Response surface methodology, Kale leaves

Enhancing STEM Education through Sustainable Food Practices: A Pedagogical Approach

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ABSTRACT

STEM (Science, Technology, Engineering, and Mathematics) education plays a crucial role in equipping students with critical thinking and problem-solving skills and preparing students with professional skills for science and technology careers. Conventional teaching methods cannot maximize the imagination of the learner and create higher-order thinking skills; the integration of sustainable food science practices within STEM education through modern pedagogy is empirically proven to enable the comprehension and application of STEM content more efficiently. A more effective and inclusive learning environment can be created by modern pedagogical approaches that improve student engagement, personalized learning experiences, and foster critical thinking and collaboration. The study aims to identify best practices for implementing sustainable food science experiments in STEM curricula that can enhance students' understanding of STEM concepts, foster critical thinking, and improve engagement. In present study sample consisted of 50 randomly selected higher education students (UG and PG level). A mixed-method approach was used, including qualitative and quantitative methods, to analyze data obtained from a questionnaire prepared by the researcher. The study contributes to innovative STEM pedagogy by demonstrating how sustainable food science can serve as an effective tool for experiential learning. The finding provides evidence-based recommendations for enhancing STEM education through Food Science. It will contribute to curriculum development by integrating experiential learning techniques that make STEM education more engaging, practical, and career-oriented and suggests a proposed framework for incorporating food science-based experiential learning in STEM curricula.

Keywords: STEM Education, Food Science, Sustainable Food Science Practices, Modern Pedagogy, Education

Study Of Some Essential Oils on Botrytis Cinerea and Leuconostoc Mesenteroides

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ABSTRACT

Synthetic additives used in agriculture and food sector are unsafe and cause detrimental effects on environment and human health. Natural products such as essential oils (EOs) are eco-friendly, safe and are also considered to have great antimicrobial properties. EOs are naturally derived and are known to have very few side effects. The antimicrobial properties of EOs like thyme, lemongrass, clove, tea tree, eucalyptus etc. have made them a major part of different industries including agriculture and food preservation. EOs have been reported to show antibacterial and antifungal properties against a wide range of bacteria and fungi. In the present study various essential oils are assessed for their antimicrobial effects on *Botrytis cinerea* and *Lecuconostoc mesenteroides*. Botrytis is the causative agent for grey mold disease in various plants like grapes, lettuce etc, and Leuconostoc causes wetwood disease of trees and causes food spoilage. The antifungal and antibacterial properties of different EOs, and their mode of action against both the selected food pathogens has been assessed. Different assays like well diffusion, disk diffusion, direct contact method, spore germination method have been used to test the antimicrobial properties of EOs. Qualitative and quantitative evaluation is also done and presented for the screened potent EOs that have shown good antimicrobial activity against Botrytis and Leuconostoc.

Keywords: Essential oils, antimicrobial, chemicals, natural products, food preservation, agriculture

Dragon Fruit Peel: A Step Towards Sustainability

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ABSTRACT

With a step towards sustainability in the direction of fruit waste valorisation and waste management, dragon fruit peel can prove to be a step closer to achieve our goal. Belonging to the genus Hylocereus, their peels are often discarded as waste which includes 30 – 35% of the total fruit, the peel is loaded with bioactive compounds like vitamins, dietary fibres, minerals and antioxidants. These compounds have been known to eliminate the issues related to cholesterol, free – radicals and promoting gut health. The peels have found their diverse applications in the production formulation like cream soup (substitute of potato), herbal tea, powder, jam, etc. in addition to this, it has been considered as a packaging solution by using pectin and batalins for spoilage indicator in meat. Besides food industry, the use of peel extract for the modification of ZnO nanoparticles has found its application in the field of cosmetics for the UV blockage. With the great color appeal, it has been used as a colorant to make the food attractive. With such as wide spectrum of application, the use of dragon fruit will play a pivotal role in the fruit waste management and getting most of the resources which are rendered to us by environment.

Keywords: Sustainability, fruit waste valorization, bioactive compounds, fruit peel

Utilization of Banana Peel as a Bioactive Ingredient: Potential Applications in the Food Industry

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ABSTRACT

As the food industry focuses on sustainability and reducing waste, agricultural by-products are being explored as functional ingredients. Banana (Musa spp.) is one of the most widely consumed fruits, yet its peel is often discarded despite its potential nutritional and functional benefits. In various cultures, banana peel has traditionally been used for food and medicinal purposes, indicating its potential for wider applications. Due to its rich composition of bioactive compounds, banana peel can be repurposed to enhance the nutritional value and functionality of different food products. This review explores the nutritional properties, bioactive compounds, and health benefits of banana peel, highlighting its potential role in food processing. It discusses how banana peel can improve food texture, stability, and preservation while enhancing its nutritional composition. Additionally, this analysis addresses challenges such as anti-nutritional factors, sensory characteristics, and regulatory considerations that must be managed for broader application in the food industry. Banana peel is abundant in phenolic compounds such as flavanols, hydroxycinnamic acids, flavan-3-ols, and catecholamines, which contribute to its antioxidant, antimicrobial, and anti-inflammatory properties. Its incorporation into food products enhances fibre content and reduces lipid oxidation, particularly in meat-based items. It also improves the texture and shelf life of bakery products and functional foods. However, anti-nutritional components like tannins and oxalates, along with regulatory challenges, must be addressed. Processing methods such as drying, fermentation, and enzymatic treatments can enhance its usability, making banana peel a promising sustainable ingredient in the food industry.

Keywords: Banana, flavanols, hydroxycinnamic acids, flavan-3-ols, and catecholamines,

Heat-Sealable Biodegradable Films from Cellulosic Residue of Wheat Biomass

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ABSTRACT

Single-use plastics, which account for 40% of plastic pollution, persist in the environment for longer durations. They degrade into microplastics and nanoplastics, impacting human and animal health. This predicament warrants the development of biodegradable plastic alternatives. To this end, cellulose-based films derived from agricultural residues such as wheat straw are promising. Globally, wheat is the second most produced crop after maize. Its biomass is underutilized but constitutes a significant amount of cellulosic residue that can converted into biodegradable packaging films. Herein, cellulosic residue from wheat biomass was extracted through alkali and bleaching treatments, solubilized in 68% $ZnCl_2$, and crosslinked with calcium ions and glycerol. The amounts of cellulose residue (0.2-0.5g), $CaCl_2$ (200-600 mM), and glycerol (0.5-1.5%) were optimized against the film tensile strength, elongation at break, and water vapor permeability (WVP) using the Box Behnken design. Later, various amounts of wheat gluten (0.04 to 0.4 g) were added to prepare films. The films possess a high tensile strength of 7 MPa, and gluten increases the elongation at the break by an additional 2% and significantly improves the heat-sealability. Developing heat-sealable and biodegradable films from agricultural residues is a significant step towards sustainable packaging and aligns with the circular bioeconomy.

Keywords: Agricultural residues, biodegradable films, gluten, heat sealable, wheat biomass.

Future Food Innovations: Sustainability, Safety, And AMR Mitigation

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ABSTRACT

The future of food science and technology is driven by the increasing demand for sustainable, safe, and nutritionally enhanced food products. With the global population projected to reach 9.7 billion by 2050, ensuring food security while minimizing environmental impact is critical. This study investigates innovations in food science, emphasizing sustainable production systems, precision fermentation, cellular agriculture, and advancements in food processing and preservation technologies. Antimicrobial resistance (AMR) presents a major public health challenge due to the extensive use of antibiotics in food production. This study evaluates how biotechnological advancements, artificial intelligence-driven food safety monitoring, and microbiome engineering can mitigate AMR while enhancing sustainability. A systematic review of recent literature, regulatory frameworks, and emerging technologies was conducted to assess their potential impact on the global food system. Findings indicate that alternative protein sources, including lab-grown meat and insect-based proteins, alongside improved fermentation techniques, can reduce reliance on conventional livestock farming, thereby lowering antibiotic usage and AMR risks. Additionally, smart packaging technologies integrated with biosensors can enhance food safety by detecting microbial contamination in real-time. AI and big data analytics in food quality assessment improve traceability and reduce foodborne illnesses. This study highlights the need for interdisciplinary collaboration among food scientists, microbiologists, policymakers, and industry leaders to develop and implement sustainable and health-focused food technologies. Addressing AMR requires stringent regulatory measures, antibiotic-free farming practices, and novel antimicrobial strategies. These findings contribute to the global transition toward a resilient, technologically advanced food system that prioritizes public health and environmental sustainability.

Keywords: antimicrobial resistance, artificial intelligence, biotechnology, food security, microbiome engineering,sustainability

Natural Pigments – Substitute to Synthetic Pigments For Food Colouration

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ABSTRACT

Colour plays a crucial role in enhancing the appeal and consumer acceptance of foods and beverages. Food manufacturers have increasingly turned to synthetic food colourants (Red 40, Yellow 5, and Blue 1) to achieve benefits like lower costs, enhanced appearance, greater colour intensity, and improved colour stability and uniformity. These synthetic colourants are chemicals which originate from coal tar derivatives, and most of them contain an azo-group. These are recalcitrant and bio-accumulative and may lead to severe health problems including hyperactivity, allergic responses, asthma attacks, reduced haemoglobin concentrations, mutations and intestinal cancers. Synthetic food colorants have been suspected to be associated with attention deficient hyperactivity disorder (ADHD) in children. Therefore, for safe human consumptions, it is important to explore natural pigments with antimicrobial, antioxidant, anti-inflammatory properties. Natural colourants are organic or inorganic compounds and may be derived naturally from plants (e.g., indigo and saffron); insects (e.g., cochineal beetles and lac scale insects); animals (e.g., some species of mollusks or shellfish); microbes (e.g. bacteria, fungi, algae, cyanobacteria) and mineral sources (e.g., ferrous sulfate, ochre, and clay). Chlorophylls, carotenoids, anthocyanins, and betalains are the extensive classes of natural colours contributing comprehensive colour shades to foods. Additionally, these are known to improve the nutritional value, appearance, texture, flavour, and storage properties of food products. In an increasingly health-conscious world, the demand for natural food colours provides a healthy and sustainable source for food colouration and is on the rise, challenging the dominance of synthetic counterparts in the food industry.

Keywords: natural pigments, synthetic pigments, ADHD, food color

Exploring the properties of traditional Indian non-basmati aromatic rice variants '*Kalanamak*' and '*Adamchini*' through Metabolomic approach

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ABSTRACT

The two distinct Indian non-basmati aromatic rice (*Oryza sativa* L.) varieties, *Kalanamak* and *Adamchini*, which have prestigious Geographical Indication (GI) tag, are comprehensively characterised in this research. This study reveals the physicochemical, thermal, and structural properties of rice flour and its isolated starch from two rice varieties, Rice A and Rice K, using a range of analytical techniques. Physicochemical analyses, including proximate composition and FT-IR, reveal that Rice A exhibits higher moisture, ash, fat, protein, and crude fibre contents compared to Rice K, while Rice K has a higher total carbohydrate content. FT-IR spectra indicate distinct functional group variations between the two rice samples. Thermal characteristics, assessed by TGA and DSC, show that Rice A has a higher maximum weight loss and differing gelatinization temperatures compared to Rice K. XRD confirms that both rice types exhibit A-type crystalline patterns, with variations in semi-crystalline or amorphous regions. Elemental analysis by EDX identifies potassium, phosphorus, sulphur, and iron in both samples, with higher iron content in Rice A. Metabolomics, performed using HRMS, detects over 1500 metabolites in both samples, including various fatty acids, amino acids, antioxidants, and sugars. Isolated starch samples (Starch A and Starch K) were similarly analyzed. Starch A shows higher moisture, ash, fat, and protein contents, whereas Starch K has a higher amylose content. TGA and DSC analyses reveal distinct thermal behaviours and gelatinization temperatures between the starch samples, with XRD confirming A-type crystalline patterns and different semi-crystalline regions. EDX analysis identifies sodium, chlorine, and iron in the starch samples, with higher iron content in Starch A. SEM reveals that both starches have irregular, polygonal granules. This comprehensive analysis provides insights into the physicochemical, thermal, and structural differences between the two rice varieties and their starches.

Keywords: Metabolomics, rice, non-basmati, *kalanamak, adamchini*, characterization

The Role of Herbal Tea in Functional Foods: A Comprehensive Review of Health Benefits and Applications

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ABSTRACT

Herbal tea has emerged as a key component in developing functional foods, offering various health benefits and applications. This comprehensive review explores the role of herbal teas in promoting health and wellness, focusing on their rich content of bioactive compounds such as polyphenols, flavonoids, and antioxidants. These compounds contribute to various health-promoting properties, including anti-inflammatory, antimicrobial, and immune-boosting effects. Incorporating herbal teas in functional foods enhances their nutritional value and provides therapeutic potential in managing chronic conditions like cardiovascular disease, diabetes, and digestive disorders. Additionally, herbal teas are applied in diverse food products, such as beverages, baked goods, and dietary supplements, where their flavor, aroma, and health-promoting properties are utilized. This review highlights the growing interest in herbal teas as functional ingredients and their promising role in improving overall well-being through dietary innovation. The review also addresses key considerations such as safety measures, quality control, and regulatory frameworks to ensure the effective use of herbal teas in functional food products. Additionally, it highlights future opportunities for innovation, including the development of unique herbal tea blends and their combined impact on promoting health and wellness.

Keywords: Herbal tea, Bioactive compounds, Functional food, Health benefits

Development and Quality Evaluation of Sweet Potato-Cauliflower Greens Salty Bites: A Sustainable Approach to Value-Added Snacking

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ABSTRACT

Food waste utilization is an emerging approach to sustainable food innovation, focusing on the transformation of underutilized by-products into value-added products. Underutilisation of nutrient-rich plant parts and food waste continue to be significant obstacles to sustainable food production. One such underutilized resource is cauliflower greens, which are often discarded despite being rich in dietary fiber, antioxidants, macro, and micronutrients and have a lot of potential for developing products with additional value. To increase nutritional value and encourage waste utilisation, the study concentrated on the formulation of salty bites. The physicochemical characterisation, and sensory evaluation of salty bites containing sweet potatoes, red potatoes, and cauliflower greens were analysed. A hedonic scale was used to assess the salty bites proximate composition (consisting of moisture, fat, bulk, protein, ash, fibre, and carbohydrates), physicochemical characteristics (such as texture, colour, and water activity), and sensory acceptability (such as taste, texture, crispiness, and overall preference). The findings showed that while retaining desired textural and sensory qualities, adding more cauliflower greens increased the nutrient content of the product. There are also economic benefits of using cauliflower greens as a sustainable ingredient in snack formulations with added value and has the potential to improve nutrition and reduce food waste. Salty bites of sweet potato-cauliflower greens could be a helpful snack alternative that addresses consumers' health concerns and supports ecologically friendly food production practices.

Keywords- Sweet potato, Cauliflower greens, Salty bites, waste utilization, Value-added product.

Evaluation Of Nutritional and Sensory Properties of Gluten Free Crunchy Bites

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ABSTRACT

The rising prevalence of gluten-related disorders, including celiac disease and non-celiac gluten sensitivity (NCGS), has increased the demand for nutritious and convenient gluten-free foods. Millets, naturally gluten-free ancient grains, offer an excellent alternative due to their rich nutritional profile, including fiber, protein, essential minerals, and bioactive compounds. This study explores the development of millet-based crunchy bites incorporating roasted and powdered foxnut (makhana), ragi (finger millet), quinoa, and amaranth seeds, to provide a wholesome and functional gluten-free snack as a viable dietary option for gluten-sensitive individuals, focusing on their nutritional benefits and potential to enhance dietary variety. Unlike conventional gluten-free products that rely on refined starches and lack dietary fiber, millet-based formulations enhance gut health, regulate blood sugar levels, and offer antioxidant benefits. Additionally, the protein quality and micronutrient composition of millets contribute to improved overall dietary balance. They can be enriched with iron, calcium, and fiber, addressing common nutritional deficiencies associated with gluten-free diets. However, challenges remain in developing millet-based crunchy bites with optimal texture, taste, and shelf stability. Advances in food processing, such as extrusion technology and natural binding agents, can improve product quality and consumer acceptance. As consumer interest in gluten-free and functional foods grows, millet-based crunchy bites present an opportunity to bridge the gap between health and convenience. Overall, the incorporation of millet-based crunchy bites into gluten-free diets can enhance nutritional quality, improve health outcomes, and offer a sustainable, accessible alternative for gluten-sensitive individuals.

Keywords: Gluten-free, Gluten sensitivity, Health, Millets, Nutrition

Formulation, Standardization and Nutritional Assessment Of Protein - Rich Ready To Cook Pancake Mix For Malnourished Children

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ABSTRACT

Protein-Energy Malnutrition (PEM) continues to be a critical global health issue, disproportionately affecting children under five. In 2019, approximately 147.7 million cases of PEM were reported worldwide, with 212,242 associated deaths. In India, the situation is particularly severe, with nearly half of the under-five population undernourished. Addressing PEM requires accessible, nutrient-dense food solutions. A pancake mix incorporating chickpea, barnyard millet, brown rice, amaranth seeds and moringa powder offers a promising dietary intervention. Chickpeas and amaranth seeds are rich in high-quality plant proteins, essential for growth and tissue repair. Barnyard millet and brown rice provide complex carbohydrates, ensuring sustained energy release. Moringa powder is a potent source of vitamins and minerals, enhancing the micronutrient profile of the diet. The roasting of these ingredients not only improves flavor but also enhances digestibility and nutrient bioavailability. This formulation aligns with nutritional strategies aimed at combating PEM by delivering a balanced macronutrient and micronutrient profile. Moreover, the ease of preparation makes it suitable for diverse populations, including those with limited cooking facilities. By integrating these nutrient-rich ingredients into a convenient pancake mix, this approach offers a practical solution to mitigate PEM, particularly in resource-limited settings. Further research is needed to assess its acceptability and effectiveness in improving the nutritional status of the target population.

Keywords: Dietary intervention, Global health issue, Nutrient - dense foods, Plant - based protein, Protein - Energy Malnutrition.

Beans A Sustainable Substitute for Meat Proteins: A Comprehensive Review

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ABSTRACT

Beans and peas rank best as meat and milk replacement from nutritional, health, environmental, and cost perspectives, a new study published in the journal Proceedings of the National Academy of Sciences (PNAS) has found. Beans have emerged as a promising alternative to meat proteins due to their robust nutritional profile, environmental sustainability, and culinary versatility. Rich in plant-based protein, fiber, vitamins, and minerals, beans offer essential nutrients with low saturated fat and cholesterol. Although many beans are incomplete proteins—lacking some essential amino acids such as methionine—this limitation can be overcome by combining them with complementary foods like grains to achieve a complete amino acid profile similar to animal proteins. Nutritionally, beans support muscle maintenance, improve digestion, aid weight management, and promote cardiovascular health while supplying significant amounts of iron, potassium, and B vitamins. Environmentally, bean cultivation requires much less land, water, and energy compared to conventional meat production, resulting in lower greenhouse gas emissions and reduced resource use. Their affordability and long shelf life further enhance their appeal as a sustainable protein source. Beans are adaptable and can be used in various dishes—from soups and salads to innovative meat analogs—making them suitable for vegetarian, vegan etc. Despite challenges such as antinutritional factors and potential digestive discomfort, proper preparation techniques effectively mitigate these issues, confirming beans as a viable, sustainable substitute for meat proteins. Thus, beans are an option. Keywords: plant-based protein, legumes, complete protein, dietary fiber, environmental sustainability, nutritional value, meat alternative, amino acid profile, health benefits, sustainable diet.

Keywords: Beans, sustainable protein source, environmental sustainability, greenhouse gas emissions

The Samovar and Its Role in Kashmiri Tea Culture – Traditional Brewing Methods and their Impact on Flavour and Nutrition

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ABSTRACT

Samovar is a traditional Kashmiri drink, often associated with the region's rich tea culture. It's a type of *Kahwa*, a flavored green tea made with a mix of spices like cinnamon, cardamom, saffron, and dried fruits such as almonds and walnuts. It's typically served in a *Samovar*, a large kettle-like vessel, which is traditionally used to brew and serve tea in Kashmir. The Samovar, a traditional Kashmiri metal urn used for brewing tea, employs a unique slow-heating mechanism that influences the flavour, aroma, and nutritional profile of teas like Noon Chai and Kahwa. Unlike modern boiling methods that expose tea to intense direct heat, the Samovar's central fire chamber provides a controlled, indirect heating system, allowing for gradual temperature rise, prolonged infusion, and enhanced flavour extraction. This study will examine the scientific principles behind Samovar brewing, focusing on heat transfer, flavour retention, and bioactive compound stability. A comparative analysis between Samovar-brewed tea and conventionally boiled tea was conducted, evaluating polyphenol content, antioxidant levels, caffeine stability, and volatile aroma preservation. The influence of Samovar material composition (copper, brass, iron) on mineral leaching and tea quality was also assessed. The present endeavour highlights the importance of traditional brewing techniques in food science and sensory enhancement. Further research could explore optimising Samovar materials for improved safety and nutritional benefits, bridging the gap between traditional culinary practices and modern food technology.

Keywords: Samovar, nutritional benefits, food safety, traditional, sensory properties

A Circular Food Economy Approach to Food Sustainability Via Synthesis of Nanoparticles Using Agri-Waste

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ABSTRACT

The global goal of reducing per capita food waste across retail, consumer, production, and food supply chains is a key priority of the United Nations' Sustainable Development Goals (SDGs) for 2030. This objective aligns with the promotion of circular economy principles to foster greater sustainability. Food systems are complex, involving multiple interactions between social and ecological factors, with both human and natural components deeply interconnected. These interdependencies call for system-oriented approaches and integrated assessment methods. Recently, sustainability has gained increasing importance across all sectors to maintain ecosystem stability and social equity. In response to these challenges, this literature review aims to establish a conceptual foundation for the "Circular Food Economy" and integrate sustainable principles within the food supply chain. Through bibliometric analysis, we can examine how circular economy principles can drive sustainability in the food industry, particularly in reducing food waste, and assess the current knowledge in the field. To support the circular food economy—an approach focused on minimizing waste and maximizing resource use—we can explore agricultural waste-based Green Synthesis methods, which have gained recognition as eco-friendly and cost-effective ways to produce nanoparticles for various applications. This study deals with the synthesis of Silver Nanoparticles (AgNPs) and their antimicrobial properties using onion peel as an agricultural waste material. This research contributes to the promotion of circular economy strategies, offering insights to guide future efforts toward a more sustainable and efficient food packaging industry.

Keywords: Circular food economy, Green synthesis, Nanotechnology, Sustainable food systems.

Chakao (Black Rice, *Oryza, Sativa L,*): Superfood on The Verge Of Recognition

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ABSTRACT

Black rice (Oryza sativa), locally known as Chakhao in Manipur, is a powerhouse of essential nutrients and bioactive compounds, making it a highly valued functional food. Rich in anthocyanin, it exhibits potent antioxidants, anti-inflammatory, and anti-cancer properties, surpassing many other rice varieties in its ability to combat oxidative stress and chronic diseases. It is an excellent source of dietary fibre, aiding digestion and promoting gut health, while its low glycemic index makes it suitable for diabetic management. Chakhao is also abundant in essential amino acids, vitamins B1 and B2, iron, zinc, and magnesium, contributing to overall metabolic health, immune function, and energy production. Unlike polished white rice, it retains its bran layer, preserving high levels of phenolic compounds and flavonoids that enhance cardiovascular health and regulate cholesterol levels. However, industrial processing techniques like drying and milling can impact its nutrient density, necessitating innovative preservation methods such as fermentation, UV-C irradiation, and controlled sprouting. Traditionally consumed as rice, kheer, or porridge, Chakhao is now being incorporated into health foods and nutraceuticals. With growing interest in nutrient-dense and functional foods, targeted research and sustainable cultivation can position Chakhao as a leading superfood for global health and nutrition.

Keywords: Chakhao, black rice, Oryza sativa, anthocyanins, antioxidants, dietary fibre, functional food, essential nutrients, glycemic index, bioactive compounds.

Media Optimization for Amylase Production Through OFAT Using Onion Peel as Substrate

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ABSTRACT

Amylase is a vital enzyme with extensive industrial applications, including in food processing, textiles, and biofuels. This study explores a novel and sustainable approach to amylase production using Bacillus subtilis and onion peel, an agro-industrial waste product, as a substrate. Onion peel, rich in carbohydrates and nutrients, was utilized to enhance enzymatic activity while reducing production costs and promoting waste valorisation. A systematic optimization of media components, including substrate concentration, nitrogen source, pH, and temperature, was performed to maximize bacterial growth, enzyme activity, and protein production. The optimized conditions—15 g/L substrate concentration, peptone (2 g/L) as the nitrogen source, neutral pH (pH 7), and a temperature of 37°C yielded the highest bacterial growth (OD 1.00), enzyme activity (0.38 µmol/min), and protein concentration (0.60 mg/ml). Purification of the enzyme using 40% ammonium sulfate precipitation achieved a twofold increase in specific activity (40 U/mg) with an 80% yield, demonstrating the effectiveness of the purification process. This research highlights the potential of onion peel as a sustainable and cost-effective substrate for microbial enzyme production. The findings not only contribute to advancing enzyme production processes but also align with global efforts to adopt eco-friendly and sustainable industrial practices. The study offers a scalable framework for enhancing amylase production and paves the way for its application in diverse industrial sectors.

Keywords: Amylase, Bacillus cereus, OFAT, onion peel, media optimization.

Cascara Kombucha: Enhancing Functionality Through Sustainable Fermentation

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ABSTRACT

Coffee cherries are harvested and then processed through either the dry method (natural process) or the wet method (washed process), with the chosen method influencing the final flavor profile and by-product generation. In dry processing, whole coffee cherries are sun-dried for two to four weeks, allowing the outer layers to dehydrate naturally. Once dried, the husk (cascara) is mechanically separated from the coffee bean. Despite being rich in polyphenols, dietary fiber, and organic acids, cascara is often discarded, overlooking its potential as a functional food ingredient. Proper drying is essential to prevent microbial growth, extend shelf life, and stabilize phenolic compounds, ensuring the retention of their antioxidant properties. Repurposing dried coffee husks, cascara, as a substrate for kombucha fermentation presents a sustainable approach to utilizing agricultural by-products. In kombucha production, a substrate refers to the primary nutrient source that fuels fermentation, traditionally consisting of sweetened tea. Cascara can be brewed into a tea-like infusion, serving as an alternative fermentation medium for the symbiotic culture of bacteria and yeast (SCOBY). Fermentation enhances phenolic and flavonoid content, improving antioxidant activity and contributing to a well-balanced flavor profile with acidity, sweetness, and aroma. Higher sugar levels can enhance bioactive compound retention and sensory appeal, while multi-strain probiotics enrich cascara kombucha with diverse microbial activity and improved functionality. This approach not only minimizes waste but also expands the functional beverage market with an antioxidant-rich, health-promoting alternative, offering commercial and nutritional potential for future applications.

Keywords: Antioxidant Rich Beverage, Cascara, Coffee Husk Utilization, Fermentation, Kombucha

CORN COBS: The Future of Sustainable Food Innovation

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ABSTRACT

Corn cobs, once an agricultural byproduct deemed trash, are undergoing a major positive transformation in the world of food science and sustainability. However, recent advances in biotechnology are beginning to reveal their application as functional food constituents, food supplements, and environmentally friendly processing aids. With his high hemicellulose, cellulose, and lignin content, the corn cob provides prebiotic-rich fibers that foster gut health, stabilize blood sugar, and improve the texture of foods. Aspergillus niger fermentation boosts antioxidant capacity; fits smoothly into bakery, dairy, and snack formulations. In the meantime, enzymatic hydrolysis processes xylooligosaccharides—a natural, gut-friendly sweetener and a game-changer for clean-label foods. In terms of food safety, activated carbon derived from corn cob is revolutionizing purification, removal of harmful toxins and decolorization. As well as being consumed, their evolution into bio-based, biodegradable packaging provides an environmentally friendly substitute to plastic and assists in achieving the circular economy. It is leading to a more sustainable, functional and innovative food system by using advanced processing and green technology so that corn cobs are not just waste anymore. This review showcases their abundant potential to improve interplay with the food industry with screws on environmental effects.

Keywords: Corn cobs; functional food; dietary fiber; prebiotics; food safe bio-packaging.

Innovations in Bakery Product Development

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ABSTRACT

The bakery industry is undergoing rapid transformation, driven by evolving consumer preferences, health consciousness, and technological advancements. Innovations in bakery product development focus on enhancing taste, texture, nutrition, and sustainability while maintaining efficiency in production. A key trend in the industry is the shift toward health-conscious formulations, including gluten-free, high-fiber, and protein-enriched baked goods. The use of alternative flours such as almond, quinoa, and chickpea has gained popularity, catering to consumers seeking healthier and allergen-free options. Additionally, the rising demand for clean-label products has led to the replacement of artificial preservatives, flavors, and additives with natural and organic ingredients. There is also a growing emphasis on plant-based and vegan-friendly formulations to meet the dietary preferences of an expanding health-conscious demographic. Sustainability has become a significant focus, with bakeries adopting zero-waste baking, using up-cycled ingredients, and implementing eco-friendly packaging solutions. The industry is also witnessing a surge in technological advancements, including AI-driven automation and 3D food printing, which are enhancing production efficiency, quality control, and product customization. These innovations help optimize ingredient usage, reduce waste, and create personalized baked goods tailored to consumer preferences. Additionally, the introduction of unique flavor profiles inspired by global fusion trends is reshaping the bakery market, offering consumers novel taste experiences while maintaining the essence of traditional baking. As consumer expectations evolve, the industry continues to adapt by integrating new technologies, sustainable practices, and health-conscious formulations.

Keywords: health-conscious formulations, gluten-free, alternative flours, natural ingredients, plant-based, fortified foods, sustainability, eco-friendly packaging, zero-waste

Pomegranate Peel and Seed Valorization

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ABSTRACT

Pomegranate (Punica granatum) processing generates a significant amount of byproducts, particularly peels and seeds, which hold immense potential for value-added applications. The peel is rich in polyphenols, flavonoids, and tannins, exhibiting strong antioxidant, antimicrobial, and anti-inflammatory properties. These bioactive compounds make pomegranate peel a valuable ingredient in functional foods, nutraceuticals, and cosmetics. Similarly, pomegranate seeds contain high-quality oil with punicic acid, known for its anti-inflammatory and cardioprotective benefits. Various sustainable extraction techniques, including supercritical CO_2 and ultrasound-assisted extraction, enhance the recovery of these bioactives while minimizing environmental impact. Additionally, peel and seed-derived compounds are increasingly explored in biodegradable packaging, pharmaceuticals, and animal feed, promoting a circular economy. Despite their high potential, challenges remain in standardizing extraction methods and ensuring product stability. Further research and technological advancements can optimize the utilization of pomegranate byproducts, reducing waste and fostering sustainability in the food and health industries. This review highlights recent progress in pomegranate peel and seed valorization, emphasizing their functional applications and prospects.

Keywords: Pomegranate byproducts, peel extract, seed oil, bioactive compounds, antioxidant, nutraceuticals, sustainable extraction, circular economy, food applications, waste valorization.

EGG POWDER

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ABSTRACT

Egg powder is a dehydrated form of eggs that retains their nutritional value while offering extended shelf life and convenience. Produced through spray-drying or freeze-drying techniques, egg powder is widely used in the food industry for its functional properties such as emulsification, foaming, and binding. It serves as a cost-effective alternative to fresh eggs in baked goods, confectionery, and instant food products. Additionally, egg powder is easier to transport and store, reducing logistical challenges. It is rich in proteins, vitamins, and minerals, making it a valuable ingredient in nutritional supplements and animal feed. The powder form also eliminates the risks of microbial contamination associated with liquid eggs. Moreover, egg powder plays a crucial role in emergency food supplies and military rations due to its long shelf life. With increasing demand for convenient and sustainable food options, the egg powder market is expected to grow. Innovations in processing technology continue to enhance its quality and application range, making it a versatile ingredient in modern food production.

Keywords: Egg powder, dehydration, spray-drying, freeze-drying, emulsification, foaming, binding, processing technology

Sustainable Packaging Practices in the Fruit and Vegetable Industry

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ABSTRACT

Sustainable packaging is becoming increasingly vital in the fruit and vegetable industry as consumers and businesses alike seek eco-friendly solutions to reduce environmental impact. The growing concern about plastic waste, resource depletion, and climate change has led companies in the food sector, to adopt more sustainable packaging practices. This study examines the sustainable packaging practices implemented at fruit and vegetable processing plant, focusing on the shift towards biodegradable, recyclable, and compostable materials. By prioritizing materials that have minimal environmental footprints, and reduce plastic use, lower carbon emissions, and contribute to a circular economy. The research also highlights the challenges faced by the industry in balancing sustainability with product protection, shelf life, and cost-effectiveness. For instance, fresh produce requires packaging that maintains its quality and prevents spoilage, while being environmentally responsible. Innovations such as plant-based plastics, edible coatings, and reusable packaging are being explored to address these concerns. Furthermore, the study discusses the role of consumer awareness and demand for sustainable packaging, which is driving companies to adopt greener alternatives. Collaboration across the supply chain, including partnerships with material suppliers and waste management organizations, is crucial for the successful implementation of sustainable packaging solutions.

Keywords: Sustainable, fruit and vegetable industry, environmental impact, packaging, biodegradable, waste.

Development of Nutritionally Enriched Millets Based Traditional Products Using Waste from Cauliflower & Cabbage Leaves

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ABSTRACT

Micronutrient Deficiencies (MNDs) are of great public health and socioeconomic importance worldwide. They affect low-income countries but are also a significant factor in health problems in industrialised societies with impacts among wide vulnerable groups in the population, including women, children, the middle-aged, and the elderly. Nutrition deals with the intake of food, considered in relation to the nutritional and energy needs of the individual. By consuming a healthy diet, many of the health problems can be avoided. The diet is largely determined by the perceived palatability of foods. Globally, most people are consuming consistently less than the daily recommended allowance requirement of the nutrient components. Even in developed countries like Australia, Canada, Europe, UK and USA researchers have concluded that there is a large gap between actual and recommended consumption of both green leafy vegetables and fruits despite decades of concern and publicity. This gap is much more in developing countries including India. The principal nutritional problems in developing countries include protein-energy malnutrition (PEM), iodine deficiency, vitamin A deficiency (VAD) and iron deficiency anaemia (IDA). A growing number of countries are confronted with new health risks linked to diet, namely cardiovascular diseases (CVD), diabetes, obesity and cancer. The present study will be carried out to use a food-based approach and utilisation of under-utilised waste from green leafy vegetables through product development as to eradicate the problem of micronutrient deficiency. Under-utilised leaves such as cauliflower and cabbage leaves will be used. These vegetables will be further processed into powdered form and then development of value-added food products will be done.

***Keywords**:* micronutrients, socioeconomic, protein-energy malnutrition, under-utilised.

By Product Utilization Of Fruits and Vegetables Peels

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ABSTRACT

The rising demand for wholesome, nutrient-dense foods has led to a steady increase in fruit and vegetable output worldwide. However, this production boom has also resulted in a notable rise in agricultural by-products, particularly peels, which are frequently thrown away as waste. Although these peels are frequently viewed as an annoyance in the food industry, they contain a variety of beneficial nutrients and bioactive substances that can be used in several ways. Utilizing fruit and vegetable peels as a by-product offers a creative and sustainable way to reduce food waste while also increasing the market value of these sometimes-disregarded resources. Essential elements like dietary fibres, antioxidants, vitamins (such C and A), minerals, and phenolic compounds are abundant in fruit and vegetable peels. These bioactive compounds have potential uses in the food, pharmaceutical, cosmetic, and bioenergy industries in addition to their exceptional nutritional and medicinal qualities. Peel dietary fibres, for example, can be utilized to create functional foods, while polyphenols and antioxidants have potential health advantages, including as anti-inflammatory and anti-cancer effects. Additionally, because of their moisturizing, anti-aging, and skin-healing qualities, the natural compounds found in peels can be used to create environmentally friendly cosmetics and skin care products. Fruit and vegetable peel waste can be used for purposes other than food and cosmetics. Bioactive chemicals may now be extracted from peels to create biofuels, bioplastics, and other sustainable products thanks to recent developments in biotechnological methods. In addition to giving agricultural waste more value, this promotes the shift to a circular economy, which lessens its negative effects on the environment by reusing and recycling resources. Despite the significant potential, there are several obstacles to the widespread use of fruit and vegetable peel by-products. These include problems with cost-effectiveness, the creation of scalable processing methods, and the successful extraction of bioactive chemicals. To encourage broad use, it is also necessary to address consumer acceptance of peel-derived goods as well as safety and regulatory issues. The present status of research and innovation in using fruit and vegetable peels as by-products is thoroughly reviewed in this study. It looks at the many uses for peel waste, the technical developments in extraction techniques, and the difficulties and possibilities in creating scalable solutions. In addition to lowering food waste, using fruit and vegetable peels as a resource supports the larger objectives of sustainability, resource efficiency, and the development of a circular economy. As a result, it offers a viable path toward developing more ecologically friendly and sustainable methods in the food and agricultural sectors.

Keywords: biofuels, bioplastics, fruit peel, vegetable peel

Strategic Business Development For Food Technology Solutions: A Market-Driven Approach

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ABSTRACT

The food technology sector is witnessing rapid advancements, necessitating innovative business development strategies to ensure sustained growth and market expansion. This project focuses on developing a structured approach to client acquisition, lead conversion, and strategic marketing within the bakery, beverage, and frozen food industries. Key initiatives included targeted marketing campaigns, client engagement through webinars, and process optimization for service execution. Contracts were successfully secured with key clients, and marketing strategies were refined based on real-time analytics. Challenges such as pricing negotiations, delayed decision-making, and campaign optimizations were addressed through data-driven strategies. This paper presents insights into business development in food technology, emphasizing the role of tailored marketing, strategic partnerships, and efficient project execution in achieving sustainable growth.

Keywords: Business Development, Food Technology, Market Expansion, Client Acquisition, Sustainable Packaging, Lead Conversion, Marketing Strategy

THEME 2
IMPACT OF CLIMATE CHANGE ON FOOD PRODUCTION AND FOOD SECURITY

Impact of Climate Change on Food Production and Food Security: A Review

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ABSTRACT

Global climate change brought on by human activity presents serious risks to the Earth and its diverse life forms. It strikingly changes biodiversity, agricultural output and food security. Food systems are affected by climate change in various ways, ranging from alterations in soil productivity and crop output to shifts in nutrient content and bioavailability in foods. The impacts extend to increased pest resistance, risk of undernourishment, and changes in food markets, pricing, and distribution networks. Among nations worldwide, India ranks as one of the most susceptible and at-risk countries to the severe consequences of climate change. Intense heatwaves, droughts, tropical storms, floods, inconsistent rainfall, and changing monsoon trends create a blend of hazards that could pose numerous social, political, economic, and security challenges for India for generations ahead. For sustainable diets to be sufficiently varied, nutrient-dense, and more in line with contextual ecosystem functions and environmental protection, climate-smart agriculture must be combined with resilient and sustainable food systems. This review article analyses the complex relationships between climate change and food security. The paper specifically explores how climate change affects the four aspects of food security: availability, access, utilization, and stability. This review focuses on the worsening effects of climate change, with a particular focus on the agriculture sector and how changing climatic patterns either directly or indirectly impact food security. The final part of the review highlights the focus on executing policies designed to lessen the impacts of climate change at both regional and global levels.

Keywords: Climate change, Food security, Malnutrition, Food availability, Food system

Ethanol Blended Petrol and Its Impact on Indian Agriculture

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ABSTRACT

The Ethanol Blended Petrol (EBP) Program is a key initiative by the Indian government aimed at reducing the country's dependence on fossil fuels and promoting environmental sustainability through renewable energy. This study investigates the impact of ethanol blending in petrol on Indian agriculture, with a focus on its economic, environmental, and agronomic implications. The primary objective is to evaluate the effects of increased ethanol demand on the production of feedstock crops such as sugarcane, maize, and other biofuel crops. The research employs a mixed-method approach, including secondary data analysis, policy review, and interviews with stakeholders in the agricultural and energy sectors. The findings suggest that ethanol blending has provided significant benefits for farmers, including higher crop prices, increased incomes, and expanded markets for biofuel crops. Additionally, it has led to improved rural employment opportunities and contributed to India's energy security goals. However, the study also highlights several challenges, such as the diversion of land and water resources for biofuel production, which may affect food security and sustainable agricultural practices. While the EBP program holds considerable potential for agricultural development, a well-integrated policy framework is necessary to optimize its benefits. Future strategies should focus on diversifying feedstock sources, improving water-efficient crops, and ensuring a balanced approach between food and fuel security to achieve long-term sustainability.

Keywords: biofuel, ethanol, food security, sustainability.

Salinization of Soil – A Consequent of Climate Change Threatens Food Security: A Review

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ABSTRACT

Food security and agricultural production is still a global challenge amidst the dramatic alterations in the conventional farming technology. Deforestation and emission of Green House Gases (GHGs) from several sources play the pivotal role in global warming and succeeding climate change. Primary or natural salinization of soil is again a detrimental outcome of this climate change. Excessive accumulation of soluble salts in soil makes the soil saline and causes degradation of soil affecting the production of plants and crops. Excess salt accumulation in land not only hampers the growth and development of plants in all possible ways (e.g. osmotic stress, nutrient stress) but also destroy the biodiversity in soil (flora and fauna inside the soil) transforming it into barren dry land. Such land is expanding across all the climate zones and continents thus leads to environmental, social, economic burden and endangers global food security. Innovative technologies, certain agricultural practices, policies of stakeholders have been adopted either to reclaim the salt affected soil or to encourage alternative plant cultivation (like salt resistant plant by genetically modified technology) in such lands but still it is not feasible to manage or use all such lands in agricultural purposes as it imposes economic burden hence extensive research is needed to ensure food security and sustainability in the light of persistent climate change.

***Keywords**:* Climate change, salinity, soil degradation, food security.

Adapting Food Systems to Climate Change: Integrating Innovation, Sustainability, and Food Security in the Modern Era

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ABSTRACT

Climate change poses an unprecedented threat to global food systems, fundamentally challenging our ability to produce, process, and distribute food sustainably while ensuring food security for a growing world population. This research examines the intricate relationships between climate change impacts and food security, while exploring innovative technological solutions and sustainable practices that can help build resilient food systems for the future. The study investigates the multifaceted disruptions that climate change introduces to traditional food production patterns, analyzing both direct impacts on agricultural productivity and indirect effects on food processing and distribution networks. Through a comprehensive assessment of emerging technologies and sustainable strategies, the research identifies key pathways for adapting food systems to climate challenges while maintaining nutritional security and environmental sustainability. Emphasis is placed on digital transformation in food processing, adaptive consumer behaviors, and the implementation of circular economy principles within food production systems. The study examines successful case studies of climate-resilient food systems and evaluates their potential for broader implementation. Key findings demonstrate that effective adaptation requires an integrated approach that combines cutting-edge technological innovation, sustainable practices, and consumer-oriented solutions. The research provides valuable insights for stakeholders across the food value chain, offering practical frameworks for building resilience while highlighting the critical role of technological advancement in ensuring food security in a changing climate. This investigation contributes significantly to the existing body of knowledge by providing actionable strategies for food system transformation and emphasizing the importance of balancing technological innovation with environmental stewardship and public health considerations.

***Keywords**:* Climate Change, Food Security, Sustainable Agriculture, Food Processing Innovation, Technological Adaptation, Resilient Food Systems, Environmental Sustainability

Impact of Climate Change on Food Production and Food Security: Challenges and Adaptation Strategies

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ABSTRACT

Climate change poses a significant threat to global food production and food security by altering temperature regimes, precipitation patterns and the frequency of extreme weather events. Rising temperatures, prolonged droughts, erratic rainfall and increased incidences of pests and diseases adversely affect crop yields, livestock productivity and fisheries. These disruptions threaten the availability, accessibility and affordability of food, particularly in vulnerable regions. Climate-induced variations also impact soil health, water availability and agricultural biodiversity, further exacerbating food insecurity. Addressing these challenges requires the adoption of climate-resilient agricultural practices, such as precision farming, agroforestry, drought-resistant crop varieties and improved water management techniques. Policy interventions, technological advancements and international cooperation play a crucial role in mitigating the adverse effects of climate change on food systems. This review explores the multifaceted impacts of climate change on food production and security while highlighting adaptation and mitigation strategies to ensure sustainable agricultural development and global food security.

Keywords: Climate change, food production, food security, crop yield, extreme weather, adaptation strategies, sustainable agriculture, resilience, water management, agricultural policy.

A Study of Cultivation and Extraction of Patchouli Oil

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ABSTRACT

Patchouli (*Pogostemon cablin*) is a valuable aromatic plant cultivated in tropical regions, primarily for its essential oil, which is widely used in perfumery, cosmetics, pharmaceuticals, and aromatherapy. The plant thrives in warm, humid climates with well-distributed rainfall, preferring slightly acidic to neutral soils rich in organic matter. A frequent growth in the worldwide market of essential oil has been observed as it holds various beneficial therapeutic properties, which make them useful in food, fragrances, and medicinal sectors. The oil has huge importance in aromatherapy and perfumery. Patchouli oil is the blend of various sesquiterpenes in which patchoulol (tricyclic sesquiterpenes) is the major constituent and the primary reason for the traditional aroma of the oil. This article gives an overview of the importance of patchouli oil, major components of the oil, techniques employed to extract oil, its biological activities, the methods to isolate patchoulol from oil. Sustainable agricultural practices such as intercropping, organic mulching, and appropriate plant spacing further contribute to optimal growth and yield. The extraction process is crucial in determining the yield and chemical composition of patchouli oil. Steam distillation remains the most common method, wherein steam passes through dried leaves to extract volatile compounds, which are then condensed into essential oil.Studies suggest that fermentation of leaves before distillation enhances both oil quality and quantity, with fermentation periods of 77 to 90 days yielding the highest concentrations of patchoulol. Advanced extraction techniques such as supercritical carbon dioxide (SC-CO_2) extraction have gained attention. This method uses high pressure and low temperature to preserve delicate bioactive compounds while producing purer, higher-yield oil. Research shows that SC-CO_2 extraction can achieve oil yields of up to 12.41%, significantly higher than traditional steam distillation, which typically ranges from 2-3%. Additionally, microwave-assisted hydro distillation has emerged as a promising technology, offering shorter extraction times and higher oil recovery. Understanding and optimizing patchouli cultivation and extraction techniques are essential for maximizing yield, sustainability, and quality.As global demand for natural essential oils continues to grow, sustainable farming practices and ethical sourcing strategies will be crucial for ensuring the long-term success of the patchouli industry. By integrating modern scientific advancements with traditional knowledge, the production of high-quality patchouli oil can continue to thrive in both economic and environmental contexts.

Keywords: oil, extraction, methods, quality, sustainability

Blockchain Technology in Food Supply Chain: Transparency and Traceability

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ABSTRACT

Blockchain technology has emerged as a transformative solution for enhancing transparency and traceability in food supply chains. With growing concerns over food safety, quality, and sustainability, blockchain offers an immutable, decentralized ledger that records every transaction along the food supply chain. This technology enables all stakeholders, from producers to consumers, to trace the journey of food products in real time, ensuring the integrity of the entire supply chain. Blockchain's key benefits in the food industry include improved traceability, which allows for rapid identification of the origin and movement of food products. This is particularly important in cases of foodborne illnesses or contamination, as it allows for swift recalls and minimizes health risks. Furthermore, blockchain promotes transparency by providing stakeholders with verifiable, tamper-proof records, ensuring that claims related to product quality, sourcing, and sustainability are accurate. The integration of blockchain also streamlines the food supply chain by reducing the need for intermediaries, which lowers transaction costs and improves efficiency. Additionally, it supports the implementation of certifications and standards, such as organic, fair trade, or non-GMO, by ensuring that these claims are verifiable and transparent at each stage of the supply chain. While challenges remain, such as scalability and adoption costs, the potential for blockchain to revolutionize food supply chains is undeniable. By ensuring transparency and traceability, blockchain technology can enhance food safety, reduce fraud, and foster consumer trust, ultimately contributing to a more sustainable and efficient food system.

Keywords: Blockchain technology, Food supply chain, Transparency, Food safety, Traceability, Regulatory compliance

A Study of Role of Artificial Intelligence in Precision Farming

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ABSTRACT

Precision farming, a data-driven approach to agriculture, leverages Artificial Intelligence (AI) to enhance efficiency, sustainability, and productivity. AI technologies, including machine learning, computer vision, and the Internet of Things (IoT), play a crucial role in real-time monitoring, predictive analytics, and automated decision-making. AI-driven systems analyze vast datasets from satellite imagery, drones, and soil sensors to optimize irrigation, fertilization, and pest control, reducing resource wastage while maximizing crop yields. The integration of AI-powered autonomous machinery and robotics further enhances precision, enabling targeted interventions with minimal human intervention. Machine learning models assist in disease prediction and early detection, allowing farmers to take preventive measures, thereby minimizing crop losses. Additionally, AI-powered climate forecasting helps mitigate risks associated with unpredictable weather patterns, improving resilience in agriculture. Technologies such as deep learning aid in weed detection and precision spraying, reducing the excessive use of herbicides and promoting environmental sustainability. Recent advancements in AI-powered decision-support systems offer tailored recommendations based on historical and real-time farm data, ensuring resource-efficient, cost-effective, and sustainable farming practices. The integration of AI in precision agriculture not only enhances crop quality and productivity but also promotes sustainable farming methods, reducing environmental degradation. As AI continues to evolve, its role in precision farming will be crucial in addressing global food security challenges and fostering a more resilient agricultural ecosystem.

Keywords: Artificial Intelligence, Precision Farming, Machine Learning, Automation, Sustainable Agriculture, Crop Monitoring, Smart Farming

Development Of Sunscreen Cream Containing the Mixed Extract From Sand Ginger (*Kaempferia Galanga* L.) Rhizome And Coat Buttons (*Tridax Procumbens* L.)

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ABSTRACT

This research aimed to develop a sunscreen cream product containing the mixed extract from sand ginger (*Kaempferia galanga* L.) rhizome and coat buttons (*Tridax procumbens* L.). The mixed extracts from sand ginger rhizome and coat buttons were prepared with 95% ethanol by two methods including reflux (hot extract) and maceration (cold extract). The physical appearance of the two extracts was dark green semi-solid with a specific odor. The mixed extract from sand ginger rhizome and coat buttons (cold extract) gave the highest percentage yield of 15.50 %. The sunscreen activity of the two mixed extracts from the sand ginger rhizome and coat buttons (hot and cold extracts) was tested by a UV-spectrophotometer. The mixed extract from sand ginger rhizome and coat buttons (cold extract) gave the highest SPF of 15.61±0.36, whereas the standard, octocrylene at the concentration of 0.02 %w/v exhibited the SPF of 23.69±0.02. Therefore, the cold extract was selected for the development of sunscreen cream. Three cream base formulas were then developed by testing their stability with the heating and cooling test for 6 cycles. It was found that the cream base formula 1 gave good skin penetration and was non-sticky. Hence, the cream base formula 1 was selected for the development of sunscreen cream. The selected extract was mixed in the selected cream base in 3 concentrations including 0.1 % w/w (CR1-1), 0.5 % w/w (CR1-2), and 1.0 % w/w (CR1-3), and their stability by the heating and cooling test for 6 cycles were performed. All samples were physically stable. Therefore, the cream formula CR1-3 containing the highest extract concentration of 1.0 % w/w was selected to test for sunscreen activity and skin irritation. The sunscreen activity of the cream formula CR1-3 was tested by a UV-spectrophotometer. The cream formula CR1-3 at the concentration of 0.02 %w/v showed an SPF of 1.24±0.01, whereas the standard, octocrylene at the concentration of 0.02 %w/v exhibited an SPF of 25.15±0.01. For the skin irritation test in ten human volunteers by the closed patch test, no irritation of the selected cream formula was observed. The cream formula CR1-3 was tested for satisfaction in thirty human volunteers. The average satisfaction score for using the selected cream formula for 4 weeks was 3.73 out of 5 points. The results from this research have demonstrated the efficacy and safety of the developed cream product containing 1.0 % w/w of the mixed extract from sand ginger rhizome and coat buttons for sunscreen. It also shows the potential of the research outcome for commercialization.

Keywords: Sand ginger rhizome extract, coat buttons extract, sunscreen cream, extraction

Development of Anti-Aging Cream Containing Extract from Red Bell Sweet Pepper Fruits (*Capsicum annuum* L.)

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ABSTRACT

The purpose of this study was the development of anti-aging cream containing extract from red bell sweet pepper fruits (Capsicum annuum L.). Fruits of red bell sweet pepper was extracted with 95 % ethanol by cold process (maceration). The appearance of the extract is orange-red viscous liquid with slightly spicy odor. The percentage yield of the extract was 32.27%. The extract showed antioxidant activity by DPPH radical assay (SC50 value of 0.24±0.02 mg/ml), which was 0.08 time of vitamin C (SC50 = 0.02±0.00 mg/ml). Moreover, it exhibited collagenase inhibitory activity with IC50 value of 81.47±5.41 mg/ml, whereas IC50 value of vitamin C was 0.03±0.00 mg/ml. But it did not give in vitro tyrosinase inhibitory activity. From 3 cream bases development and stability test by the heating-cooling of 6 cycles, the best cream base formula C2 was selected, because it gave physical stability, proper viscosity, good feeling of use and not sticky. The selected cream base formulation was mixed with the extract at 3 different concentrations of 0.1, 0.5 and 1.0% (w/w) which represented as formula A1, A2 and A3, respectively. After the stability test by the heating-cooling test for 6 cycles, the color, odor and viscosity of formula A1 did not change, while formulas A2 and A3 showed unstable with color change and layer separation at 4 and 45 °C after heating-cooling test for 1 cycle. Thus, the best cream formula A1 was selected, because it gave good stability. However, the cream containing the red bell sweet pepper fruits extract showed no free radical DPPH scavenging and collagenase inhibitory activities. It gave slightly tyrosinase inhibitory activity (IC50 value > 1000 mg/ml), whereas IC50 value of kojic acid was 0.01±0.00 mg/ml. For skin irritation test of the selected cream in 10 human volunteers, it showed no skin irritation. For satisfactory evaluation by 30 human volunteers, the satisfaction score of the product after application for 4 weeks was 4.28 out of 5. The estimated cost of the product which exclude packaging and advertising cost was 113.04 Baht per kilogram (0.11 Baht per gram). The developed product had the cost lower than the commercial product of 56.63 times. The result of this study shows the potential of extracts from Thai plants, which will be possible for the further development of an anti-aging cosmetic for commercialization.

Keywords: red bell sweet pepper extract, Capsicum annuum, antioxidant, tyrosinase inhibition, collagenase inhibition, anti-aging

Development of Anti-aging Cream Containing the Extract from Mango (*Mangifera indica* L.) Leaf

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ABSTRACT

Aging is the main cause for skin degeneration including abnormal pigmentation, increased wrinkles, loss of elasticity, dry and rough. Mangiferin, an active constituent from mango (*Mangifera indica* L.) leaf, has been previously reported to has anti-aging and whitening activities. This research aimed to develop an anti-aging cream product containing the extract from mango leaf. The extracts from mango leaf were prepared by two methods including reflux (hot extract) and maceration (cold extract) using two solvents including 95% ethanol and distilled water. The physical appearance of the four extracts was brown semi-solid with specific odor. The percentage yields of the four extracts were in the range of 9.87-14.54 %. The extract from mango leaf (hot water extract) gave the highest percentage yield of 14.54 %, whereas the extract from mango leaf (cold ethanol extract) gave the lowest percentage yield of 9.87 %. Besides, the pH of the four extracts were in the range of 3.77-4.92. The extracts from mango leaf were weak acid. The extracts from mango leaf will be further investigated for anti-aging activity including free radical scavenging activity and inhibition of tyrosinase activity. Then, the extract from mango leaf which exhibited the highest anti-aging activity will be selected for development of anti-aging cream. The results from this research have demonstrated the preparation of the extracts from mango leaf for further development of cream product containing the extract from mango leaf for anti-aging. It also shows the potential of the research outcome for commercialization.

Keywords: Mango leaf extract, anti-aging cream, extraction

Impact of Rising Temperatures on Horticultural Crops in Hilly areas

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ABSTRACT

In Hilly areas of India such as Jammu and Kashmir, Himachal Pradesh, Uttarakhand, where horticulture plays a critical role in the local economy and food security, rising temperatures due to climate change are becoming increasingly problematic. Traditionally known for its high-quality apples, pears, and stone fruits, the region is witnessing noticeable shifts in crop behavior. Higher temperatures are causing crops to bloom earlier than usual, which can lead to a mismatch with the availability of pollinators and ultimately result in a poor fruit set and reduced yields. For example, apple orchards are experiencing early blooming under less-than-ideal conditions, leading to smaller fruit size and lower nutritional content. In addition to altering the timing of growth stages, the heat intensifies water stress, making plants more vulnerable to drought and increasing the likelihood of pest and disease outbreaks. Local field studies over the past decade have shown changes in the growing season and a general decline in the performance of horticultural crops. These challenges highlight the urgent need for adaptive strategies, such as developing heat-tolerant varieties through both traditional breeding and modern molecular techniques and improving water management practices like regulated deficit irrigation. Integrated pest management and advanced agronomic practices are also essential to help farmers cope with these changes. Moreover, predictive modeling and climate-resilient farming practices can provide valuable insights for policymakers and agricultural stakeholders, guiding them in designing region-specific adaptation strategies. Addressing these challenges is not only vital for maintaining the productivity of horticultural sector but also for ensuring that local communities continue to have access to nutritious, high-quality fruits in a warming climate.

Keywords: Climate Change, Horticulture, Heat Stress, Apple.

Sustainable Agriculture and Economic Growth: Addressing CO2 Emissions in Global Leading Economies

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ABSTRACT

Climate change is a continuous threat faced by all over the world. The GDP share of agriculture in 16 countries among the members of the G20 nations is approximately 4.73% on average as of 2023. Agriculture provides income and employment mostly in developing countries, which leads to their economic growth. Simultaneously, it highly contributes to environmental degradation and climate change. According to the World Bank, on-farm activities in agriculture and land use contribute about 10-12% and 12-20%, respectively, in carbon emissions. Rapid development and over-mechanization in agriculture have led to remarkable growth in carbon emissions, which is a major contributor to global warming. These carbon emissions in turn impact weather as well as soil fertility, which are responsible for agricultural production. Some studies reported a decline in crop yields due to drastic changes in climate in agricultural-based economies. The 2023 Global Economic Alliance summit highlighted the significance of addressing the changing climate and global food security. Along with it, it stressed upon adopting sustainable agricultural practices. This study analyses the relationship between agricultural productivity, economic growth, and CO2 emissions covering the period from 1990 to 2022 for G20 countries. The Augmented Dickey-Fuller unit root test was applied to check the stationarity of the variables to show the causality linkage between the study variables; the autoregressive distributed lag (ARDL) testing technique has been used. The understanding of the interdependence of these variables can help in achieving sustainable development goals. In light of this study, it is important to have sustainable agriculture to ensure global food security and support the growth of any country. Also provides suggestions to policymakers to reduce carbon emissions from agriculture and promote sustainability and a greener future.

Keywords: Agricultural productivity, Economic growth, global warming, Carbon emission, Global food security, Sustainable Agriculture, G20, ARDL

Behavioural Shifts for a Greener Future: Urban Food Waste Segregation and Energy Solutions

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ABSTRACT

Over one-quarter of the food supplied for human consumption across the food supply chain is wasted. Food waste has significant environmental, social and economic effects on every country as greenhouse gas generated at different stages of food chain are at staggering proportions. In high-income countries, household food waste accounts for more than half of overall food waste, making it one of the leading causes of food waste. The fundamental impediment to this problem is a lack of effective waste separation at the source, which resides in consumer behavior. Thus, the study aims to examine the key variables that influence waste segregation behavior among the residents of Noida. The data collected from 4 distinct sample groups are analyzed to determine their waste segregation intention and behavior by employing an extended theory of planned behavior and a structural equation model. The study also attempts to investigate how such intentions drive the conversion of waste to renewable energy in the context of bio-refinery concepts. The expected outcome of the study is to find significant factors influencing waste segregation behavior and the adoption of corrective nudges accordingly. The study provides valuable insights for the policymakers to address the issues of waste management for sustainable urban settings.

Keywords: Food waste, Segregation at Source, Consumer Behavior, Renewable Energy and Theory of Planned Behavior.

Impact of Fermented Organic Manure (FOM) on Soil Health and Microbial Diversity in Sustainable Agriculture

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ABSTRACT

Organic amendments are being increasingly applied to agricultural soils as alternatives or complements to inorganic fertilisers. Fermented Organic Manure (FOM) has emerged as a sustainable alternative to synthetic fertilisers, significantly influencing soil health and microbial diversity. FOM amendments can increase the content of soil organic matter which directly promotes the amount of organic carbon in soil, concomitantly improving soil physical, chemical and biological properties. The effect of the application of commercial or farm-made FOM amendments, on crop yield and nutritional status, as well as on soil physicochemical and microbial properties as indicators of soil quality. Additionally, it supports plant growth by facilitating nutrient cycling and suppressing soil-borne pathogens. The integration of FOM into sustainable agricultural systems aligns with eco-friendly practices, reducing chemical input dependency while maintaining productivity. However, the effectiveness of FOM depends on fermentation processes, raw materials, and environmental conditions. However, the effectiveness of FOM depends on fermentation processes, raw materials, and environmental conditions. Future research should focus on optimizing production techniques and assessing long-term impacts on different soil types and cropping systems. Overall, the strategic application of FOM at the optimal dose (according to the NPK requirements of crop) can be a beneficial agronomic practice for agricultural soil quality, posing a suitable alternative to mineral fertilisation.

Keywords: Fermented Organic Manure, Soil Health, Microbial Diversity, Sustainable Agriculture, Soil Fertility, Nutrient Cycling

Impact Of Climate Change on Soil Health

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ABSTRACT

Climate change is significantly altering soil health, with rising temperatures, erratic precipitation patterns, and extreme weather events accelerating soil degradation. A key aspect of soil health—soil organic matter (SOM)—is particularly vulnerable to these changes. In India's Indo-Gangetic Plain, a crucial agricultural region, declining SOM levels are reducing soil fertility, impairing water retention, and weakening soil structure, leading to increased erosion and lower nutrient availability. Higher temperatures and altered moisture regimes accelerate the decomposition of SOM, resulting in the loss of essential carbon stocks and microbial biodiversity. Additionally, extreme weather events such as droughts and floods further disrupt SOM balance, hindering soil's ability to support sustainable agriculture. This study examines the intricate relationship between climate change and SOM dynamics in the Indo-Gangetic Plain, analysing its implications for soil productivity and long-term ecosystem stability. The findings emphasize the need for adaptive soil management practices, including conservation tillage, cover cropping, and organic amendments, to mitigate climate-induced SOM loss and maintain soil resilience in the face of environmental challenges.

Keywords- precipitation, degradation, soil organic matter, adaptive soil management practices

Status and Drivers of Crop Diversification in Indian States: An Economic Analysis

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ABSTRACT

Amidst growing urbanisation, rising female labour force participation, enhanced per capita income there is shift in the consumption patterns on one side and decelerating agricultural growth on the other side due to the adoption of a cropping pattern not conducive to the agricultural ecosystem has resulted in adverse climatic conditions. Shifting from traditional water-guzzling crops to high-value crops is an apt strategy for the sustainability of agriculture to ensure food sufficiency of the growing Indian population and addressing the nutritional security.as well. Agro biodiversity plays an important role in crop diversification and the growth of agricultural production. The present study examines the extent of crop diversification across six agro-climatic regions covering 28 states and about90 per cent of the gross cropped area. Secondary data for areas under crop, subcategories into cereals, pulses, fruits & vegetables, sugarcane, spices & condiments, fiber, oilseed, drug & plantation and others collected from land use statistics were used for measuring Crop Diversification using Simpson's Index. The study exhibits asymmetrical diversification across regions, with the highest diversification in southern semi-arid regions toward high-value crops. The study further probes into the drivers of crop diversification using regression analysis and concludes with redesigning and implementing different strategies for crop diversification as per the agroclimatic region's resource availability and specific needs at the local level in these regions to make the agricultural ecosystem sustainable. The insight emanating from the study emphasizes comprehensive policy support regarding easy access to credit, insurance coverage, marketing infrastructure, and state-of-the-art technology for augmenting farms' income and enhancing farmers' livelihoods.

Keywords: Sustainable Agriculture, Crop Diversification, Agrobiodiversity, Simpon Index

Lentils (*Lens Culinaris*): Nutritional Food Source During Changing Climatic Conditions

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ABSTRACT

Lentils (*Lens culinaris*) is an annual leguminous pulse crop widely cultivated across the globe. Among various legumes, lentils stand out due to their drought-tolerance and ability to grow in a wide range of soils, from light to heavy, with a varying pH of 5.5–9. This makes them well-suited for cultivation in regions with limited water resources or during unpredictable climatic conditions. *Lens culinaris* is rich in proteins, fibers, vitamin B-complex, and micronutrients such as magnesium, iron and folate. High protein content (~25%) makes lentils excellent substitute for animal-based proteins, which is essential in regions where animal-based food may be costly or impractical. Lentils due to their high fiber content, low fat are known to help in managing blood sugar levels, improving digestive and heart health. In addition, they have long shelf life, easy availability and storage which makes them ideal food during emergencies/survival situations that may arise due to drastic climatic changes. It is also important to maintain, cultivate and safeguard highly diverse lentil cultivars to manage germplasm resources during changing environmental conditions and for food security. The present study summarizes the importance of Lentil cultivation during adverse conditions. Further, we have collected different genotypes of *Lens culinaris* growing in various geographical regions of the world that are being analysed for their diversity based on agro-morphological, genetic and nutritional variations.

***Keywords**:* agro-morphology, climate change, cultivation, lentils, nutrition

From Farm to Table: The Impact of Environmental AMR On Food Safety and Quality

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ABSTRACT

The environmental dissemination of AMR frequently defined as a promising risk to food safety and quality that eventually influences long-term public health and agricultural sustainability. Widespread use of antibiotics in natural environments like animal agriculture, aquaculture, and plant cultivation together with insufficient treatment of effluents, led to the survival and spread of such bacteria. Resistant microorganisms may contaminate soil, water, and air and may eventually enter the food chain by way of agricultural materials, animal products, and fish. These resistant bacteria can increase the risk of foodborne diseases, reduce efficiencies of antimicrobial agents used in food processing, and decline in quality of food products from spoilage. Additionally, the resistant bacteria in food processing plants elevate fears of cross-contamination and spread of resistant genes. Addressing the environmental AMR would make sure food security, protect public health, and mitigate risks to global food safety. This research examines the environmental pathways for AMR and its impact on food quality. This creates the very crucial appeal for effective waste treatment, ecologically sustainable agricultural practices, and improvement of regulatory guidelines to monitor antibiotic usage and pollution control. A multi-disciplinary tactic including government officials, scientists, and industry specialists is required to offer sustainable choices to counter the spread of AMR. Future food systems must emphasize comprehensive surveillance, alternative disease management strategies, and improved public awareness to mitigate AMR risks and maintain food safety.

Keywords: Antimicrobial Resistance (AMR); Environmental Contamination; Food Safety; Public Health; Sustainable Agriculture

Textile Dye Removal Using Adsorbent Beads: Implications for Water Safety and Agricultural Sustainability

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ABSTRACT

The textile industry is a major contributor to water pollution due to the release of synthetic dyes, which pose serious environmental and agricultural threats. Contaminated irrigation water can lead to soil degradation, reduced crop productivity, and the accumulation of toxic compounds in food crops, affecting food safety and human health. This study presents an innovative and sustainable approach for the removal of textile dyes using adsorbent beads synthesized from polyvinyl alcohol (PVA), pectin, and bentonite. The biodegradable composition of these beads enhances their environmental compatibility while providing effective dye adsorption capacity. The structural characteristics of the beads were analyzed, and their adsorption efficiency for Acid Red 27, a commonly used textile dye, was evaluated under varying pH conditions, contact time, and initial dye concentration. The results demonstrate that the developed adsorbent beads achieve significant dye removal while maintaining stability and reusability, making them a promising solution for wastewater treatment. The sustainable nature of this approach aligns with global efforts to mitigate industrial pollution and promote water conservation, ultimately supporting safe and sustainable food production. This study highlights the importance of green materials in environmental remediation and their potential application in ensuring the safety of agricultural resources. The findings contribute to the broader discussion on innovations in food safety and environmental sustainability, making them relevant to the future of food science and technology.

Keywords: Textile dye degradation, adsorbent beads, sustainable water treatment, food safety, environmental remediation.

Decoding Gene Expression Pattern of Phyllosphere Bacterium For Sustainable Agriculture

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ABSTRACT

The aerial surface of plants, mainly the leaves, is known as the phyllosphere and is inhabited by various microorganisms, including bacteria, fungi and yeast. Application of pesticides in farming is prevalent to increase crop yield by protecting crops from pests, diseases and weeds. However, their use has severe negative impact on environment, human health and sustainability. Direct and repeated foliar sprays of pesticides can persist on leaf surfaces leading to pesticide–resistant bacterial strains which have potential to degrade pesticide residues, contributing to bioremediation. This study aimed to shed light on the gene expression patterns and deciphered the genes involved in biological pathways that undergo changes due to pesticide stress condition. In our earlier investigations, by using 16SrRNA and GC-MS techniques we identified, among the other microbial species, the bacterial strain of Azotobacter isolated from the surface of okra plant has the significant ability to degrade chlorpyrifos and cypermethrin. Transcriptomics studies were conducted using RNA sequencing on Illumina platform to analyze Differentially expressed genes (DEGs) revealing significant mRNA expression changes after 24 hours of pesticide exposure. The analyses of upregulated genes and functional enrichment revealed that significant upregulation occurred to numerous genes naming CES1, TPMT, PON1, ALDH, CYP-1A2, DGAT1, PLA-2G4 and FAS when exposed to chlorpyrifos. Genes like CPDA, TPMT, ALDH, ADH, CYP1A2, CYP3A4, and GSS were upregulated in the presence of cypermethrin. Upregulation of DEGs was associated mainly with cellular, metabolic, nitrogen compounds metabolism, and biosynthetic processes. Also, a significant downregulation was seen in many genes related to cellular, biological, and metabolic processes. Understanding these interactions can help in developing strategies to reduce the adverse impacts of pesticides to promote sustainable farming.

Keywords: *Azotobacter*, chlorpyrifos, cypermethrin, phyllosphere, Transcriptomics

Climate Variability and Food Security: Examining the Impact of Rainfall and Temperature on Indian Agriculture

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ABSTRACT

Since a significant portion of cropland is still rain-fed, climate variability, particularly variations in temperature and precipitation, has a significant impact on agricultural productivity in India. The rising temperatures often result in crop heat stress, reduced yields, increased evapotranspiration, and changed crop patterns and excessive or insufficient rainfall leads to agricultural instability by causing droughts, floods, soil erosion, and water scarcity. These climate changes not only affect crop productivity and farmer livelihoods, but they also contribute to disease transmission and pest outbreaks. The adverse effects of climate fluctuations on agricultural production pose a direct threat to food security by reducing crop yields, increasing food price volatility, and limiting access to essential staples. Small and marginal farmers, who form the backbone of India's agrarian economy, are particularly vulnerable. This study uses time series regression to examine how temperature and precipitation variations impact agricultural productivity and food security in India. This study examines how food security, agricultural productivity, and changes in temperature and rainfall are related, highlighting the urgent need for adaptation strategies to improve the irrigation facilities and strengthen climate adaptation measures is necessary to ensure a consistent food supply, prevent starvation, and preserve economic stability in the face of increasing climate uncertainties.

Keywords: Temperature, Rainfall, Agriculture Productivity, Food security, Climate change

Plasma-Activated Water: A Novel Eco-Conscious Bio stimulant for Enhancing Seed Germination and Plant Growth

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ABSTRACT

This comprehensive review examines the multifaceted effects of plasma-activated water on seed germination and overall plant growth. Sustainable agriculture necessitates the exploration and advancement of eco-friendly technologies to enhance crop productivity. In recent decades, non-thermal plasma-based technology has emerged as a promising frontier in this pursuit. Non-thermal plasma techniques offer promising applications for enhancing seed germination rates and promoting plant growth. These techniques trigger a cascade of biological responses at the molecular level within seeds and plants, leading to improved nutrient uptake, enhanced antioxidant activity, and effective pathogen control. Consequently, they contribute to better germination, robust seedling development, enhanced plant growth, and increased crop yields. Plasma-activated water (PAW) has emerged as a green and sustainable technology for food processing and production. The synergistic action of various reactive oxygen and nitrogen species (RONS) in PAW contributes to its unique and beneficial properties. Compared to conventional methods, PAW offers rapid and efficient treatment for a wide range of products, irrespective of their volume or shape. With the exponential growth of research on plasma-activated water (PAW), this review aims to summarize the current understanding of its underlying principles and effects while highlighting its potential applications in food science and technology.

Keywords: Plasma activated water, Non thermal techniques, RONS.

Impact of fermentation on the nutrition profile of traditional foods

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ABSTRACT

Fermentation is a widely practiced traditional food-processing technique that significantly enhances the nutritional profile, bioavailability, and functional properties of various food products. This biochemical process is mediated by a diverse group of microorganisms, including lactic acid bacteria, yeast, and molds, which facilitate the breakdown of complex macronutrients into more bioaccessible and bioactive compounds. Fermentation has been shown to improve protein digestibility through enzymatic hydrolysis, leading to the release of essential amino acids and bioactive peptides with potential health benefits. Additionally, microbial metabolism enhances the synthesis of essential vitamins, particularly B-complex vitamins (B2, B6, B12) and vitamin K, which contribute to improved micronutrient availability. The production of organic acids, short-chain fatty acids, and probiotic microorganisms further promotes gut microbiota balance, aiding in digestion, immune modulation, and overall metabolic health. Furthermore, fermentation reduces the concentration of anti-nutritional factors such as phytates, tannins, and lectins, thereby improving mineral absorption and reducing gastrointestinal discomfort. Traditional fermented foods, including dairy-based products (yogurt, kefir), cereal-based foods (Dosa), and legume-based products (tempeh, miso), have been extensively studied for their role in promoting gut health, reducing inflammation, and contributing to a sustainable diet showing the great impact of fermentation on the nutritional and functional properties of traditional foods, emphasizing its role in enhancing dietary quality, health outcomes, and food security.

Keywords: Fermentation, Nutritional Enhancement, Probiotics, Bioactive Compounds, Gut Health, Traditional Foods, anti-nutritional Factors, Vitamin Biosynthesis, Protein Digestibility, Food Bioavailability

Exploring the Impact of Bifidobacterium on Inflammation in Colorectal Cancer

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ABSTRACT

In recent years, the gut microbiome has garnered significant attention due to its multifaceted impact on human pathophysiology, particularly in relation to cancer. The interplay between the gut microbiome and the intestinal immune system has been well-established in the development and prognosis of colorectal cancer. As a prominent probiotic, Bifidobacterium is thought to exert both anti-tumor and chemo-protective effects, primarily through xeno-metabolism and immune modulation during cancer treatment. However, some studies suggest that Bifidobacterium may also have adverse effects, raising concerns about its role in cancer treatment. This has prompted researchers to critically assess both the potential benefits and drawbacks of Bifidobacterium in the gut microbiome of cancer patients. This study reviews current strategies involving the administration of probiotic Bifidobacterium strains, which have demonstrated anticancer activity in colon cells through the modulation of anti-apoptotic genes. The study will also focus on the apoptotic effects of Bifidobacterium species on colon cancer cell lines, shedding light on their therapeutic potential and limitations.

Keywords: Bifidobacterium; Colorectal cancer (CRC); Probiotic; Xeno-metabolism; Inflammation.

Climate Adaptive Bio Film

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ABSTRACT

Climate change is intensifying food industry challenges by accelerating spoilage, increasing post-harvest losses, and disrupting supply chains due to extreme weather conditions. Rising temperatures, fluctuating humidity, and pathogen outbreaks have made conventional food preservation methods less effective, leading to higher food waste. To mitigate these challenges, this study proposes "Second Skin on Crops," an innovative climate-responsive edible biofilm designed to extend shelf life, enhance food safety, and reduce waste. This biodegradable, plant-based coating acts as a protective layer that self-adjusts to environmental conditions. It incorporates a moisture-regulating hydrogel that prevents dehydration in dry climates and repels excess moisture in humid conditions, reducing mold and decay. A UV-protective bio-pigment layer minimizes heat-induced nutrient loss, while natural antimicrobial compounds from essential oils and probiotics combat spoilage-causing bacteria and fungi. Additionally, oxygen and ethylene-scavenging nanoparticles slow down fruit ripening, prolonging freshness by up to 50%. Unlike synthetic plastic coatings, this edible biofilm is fully biodegradable, safe for consumption, and does not require removal. By integrating climate-adaptive features into existing edible coatings, this innovation provides a scalable and cost-effective solution for global food security. Its application across fresh produce, grains, and dairy products offers an environmentally friendly alternative to conventional preservation methods, reducing food waste and ensuring longer-lasting, safer food in the face of climate change.

Keywords: Biodegradable, Biofilm, Climate-responsive, Food preservation, Sustainability

Ecofriendly and sustainable management of soil borne diseases of fenugreek under changing climate conditions.

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Abstract:

Fenugreek (*Trigonella foenum-graecum*), an important medicinal and culinary crop, is highly susceptible to fungal diseases such as root rot, powdery mildew, and downy mildew. Under changing climatic conditions, rising temperatures, altered precipitation patterns, and increased humidity favor the proliferation of fungal pathogens, leading to significant yield losses. Ecofriendly disease management strategies are essential for sustainable fenugreek cultivation while minimizing environmental hazards associated with chemical fungicides.

Biocontrol agents such as *Trichoderma* spp., *Pseudomonas fluorescens*, and *Bacillus subtilis* have shown promising results in suppressing fungal infections by competing for nutrients, producing antifungal compounds, and inducing plant defence responses. The application of oil seed cakes, botanicals offer natural fungicidal properties without harming beneficial soil microbes. Additionally, organic amendments such as farmyard manure, compost, and vermicompost enhance soil microbial diversity, suppressing fungal pathogens while improving plant health.Cultural practices, including crop rotation, solarization, and the use of resistant varieties, are crucial in preventing fungal outbreaks. The integration of precision agriculture technologies, such as remote sensing and climate-based disease prediction models, can aid in early disease detection and targeted interventions.Adopting an integrated ecofriendly management approach ensures sustainable disease control, reduces chemical dependency, and enhances crop resilience against climatic variations. Further research on climate-resilient fenugreek varieties and novel biocontrol formulations is needed to strengthen sustainable disease management strategies in changing environmental conditions.

Key words : *Trichoderma* spp., *Pseudomonas fluorescens*, *Bacillus subtilis,* climate-resilient, climate-based disease prediction models

Impact of climate change on soil-borne diseases and horticultural crop production in Sagar district, Madhya Pradesh: A study.

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Abstract :

Climate change significantly influences soil-borne diseases, affecting the growth and yield of horticultural crops in Sagar district, Madhya Pradesh. Rising temperatures, altered precipitation patterns, and increased humidity create favourable conditions for pathogens like *Fusarium*, *Phytophthora*, and *Rhizoctonia*, leading to severe crop losses. Changes in soil microbiota and nutrient availability further exacerbate disease incidence, reducing crop resilience. This study explores the correlation between climatic factors and soil-borne disease proliferation, emphasizing their impact on crops such as tomato, chili, and onion. Field surveys and laboratory analyses were employed to assess disease dynamics and their effects on crop production. The findings indicate a need for adaptive management strategies, including resistant varieties, soil amendments, and integrated disease control practices. Addressing these challenges is essential for sustaining horticultural production under changing climatic conditions in the region.

Keywords: Climate change, Soil-borne diseases, Horticultural crops, Disease management

THEME 3
NUTRITION, HEALTH & FUNCTIONAL FOODS

Effect of Turmeric (Curcumin) on Cancer Patients: A Comprehensive Review of its Anticancer Mechanisms, Clinical Efficacy, and Potential Therapeutic Applications

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ABSTRACT

Turmeric, specifically its bioactive compound curcumin, has attracted substantial interest for its potential anticancer properties. This comprehensive review evaluates the effects of curcumin on cancer patients by analysing its mechanisms of action, clinical efficacy, and therapeutic potential. The primary objective is to assess whether curcumin can effectively inhibit cancer progression and improve patient outcomes. The study involves an extensive analysis of preclinical and clinical research, focusing on curcumin's mechanisms, including its antioxidant, anti-inflammatory, and pro-apoptotic effects on various cancer cell lines. Additionally, it examines clinical trials assessing curcumin's safety, bioavailability, and therapeutic benefits in cancer patients. Key findings indicate that curcumin exhibits significant anticancer properties, including inhibition of tumor growth, suppression of metastasis, and induction of apoptosis. However, its clinical application is hindered by poor bioavailability, necessitating the development of curcumin analogs and advanced delivery systems to enhance its therapeutic efficacy. Several clinical studies report promising outcomes, such as reduced tumor markers, improved immune response, and enhanced quality of life in cancer patients. Furthermore, curcumin's ability to modulate critical molecular pathways, including its potential as an adjunct therapy. Emerging research suggests that combining curcumin with conventional treatments may improve therapeutic outcomes and reduce adverse effects. While curcumin shows significant promise, large-scale, randomized clinical trials are necessary to establish standardized treatment protocols, optimize bioavailability, and determine its long-term safety and effectiveness in cancer management.

Keywords- Anticancer properties, Bioavailability, Curcumin, Inhibit, Tumor inhibition

Plant Based Ready to Use Protein Beverage for Fitness – A Sustainable Food Solution

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ABSTRACT

Protein is considered as a key component for the athletes and fitness adherent for their performance enhancement. Athletes chose animal-based proteins are the source of protein where the bioavailability and digestibility are good, but animal-based protein contains more saturated fat where it leads to many chronic diseases and improves weight. To produce meat as a protein source from animals it takes more land, water and other resources when compared to plant-based proteins. The online survey done on the commercial protein mixes it was found that a few cost-effective plant-based protein mixes are available for the Indian fitness adherents and athletes. It was also observed that most of the female athletes and fitness adherent are not meeting the RDA of essential nutrients like iron and calcium which results in low nutritional status and reduced recovery rates. In the present study a sustainable plant-based protein mix was developed which may enhance the athletic performance especially in female athletes by improving muscle mass, muscle recovery, weight management and meeting RDA. The developed mix showed good nutritional profile along with the presence of the essential amino acids and a moderate to high digestibility score of 0.70 in terms of PDCASS. The mix also exhibited significant ($p<0.05$) antioxidant and anti-inflammatory properties. The developed mix was also studied for other properties such as water absorption capacity, hygroscopicity, solubility index, bulk density, tapped density and the swelling index. The solubility index and swelling index were 79.2±1.13 and 4.35±0.21. The product also showed good sensory scores ranging from 7-8 out of 9-point hedonic scale along with shelf stability of 4 months.

Keywords: Plant-based proteins, athletes, fitness, sustainability

Development And Sensory Evaluation of Multi-Grain Crackers for The Management of Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

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ABSTRACT

Metabolic dysfunction-associated steatotic liver disease (MASLD) has become the most prevalent liver condition worldwide, closely linked to metabolic risk factors, including type 2 diabetes, overweight and obesity. This study aims to conduct an e-survey to analyze commercially available food products for MASLD and formulate specialized food products for MASLD management. Five cereals with hepatoprotective properties were selected to formulate multi-grain crackers based on their novelty and accessibility. The control cracker (C) was prepared using 100% wheat flour, while four formulations incorporated multi-grain flour in varying proportions: (C1) 40%, (C2) 50%, (C3) 60%, and (C4) 80%. Sensory evaluation was conducted with twenty semi-trained panelists using a 9-point hedonic scale to assess color, appearance, aroma, texture, flavor, taste, and overall acceptability. Data analysis, performed using Microsoft Excel (version 2501), included calculations of mean and standard deviation. The market survey revealed a lack of commercially available food products specifically designed for MASLD management, though supplements such as syrups, capsules, and powders formulated with Ayurvedic herbs and spices were available. Sensory analysis indicated that the C3 formulation (60% multi-grain flour) had the highest overall acceptability (7.5±0.1), significantly differing in appearance, colour, aroma, texture, flavour, taste and overall acceptability from the control cracker ($p<0.05$). In contrast, the C4 formulation (80% multi-grain flour) had the lowest overall acceptability (6.1±0.3). These findings suggest that the C3 formulation demonstrated the most favorable sensory attributes, making it a promising dietary intervention for MASLD management.

Keywords: MASLD, food product development, crackers, cereals, sensory analysis

Maharashtrian Traditional Pearl Millet Chunks (Bajra Kharwadi): A Nutritious Snack

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ABSTRACT

Pearl millet (bajra) chunks, locally known as Bajra Kharwadi, represent a traditional Maharashtrian snack that combines nutritional excellence with cultural heritage. This ancient preparation utilizes pearl millet, a drought-resistant grain native to the semi-arid regions of Maharashtra, alongside indigenous spices and preparation techniques passed down through generations. Bajra Kharwadi offers exceptional nutritional benefits, being rich in dietary fiber, protein, essential minerals (iron, zinc, magnesium), and antioxidants. The preparation process—involving soaking, grinding, fermentation, steaming, and often sun-drying—preserves the grain's nutritional integrity while creating a distinctive texture and flavor profile. The addition of traditional spices like cumin, coriander, and chili not only enhances palatability but also contributes additional health benefits. Nutritional assessment confirms Bajra Kharwadi as an exceptional source of complex carbohydrates, plant protein, dietary fiber, and micronutrients including iron, zinc, and B vitamins. The natural fermentation process enhances bioavailability of minerals while reducing anti-nutritional factors. Beyond nutrition, Bajra Kharwadi represents cultural sustainability by preserving traditional food knowledge and supporting local agricultural practices. As global interest in traditional, nutrient-dense foods increases, this humble Maharashtrian snack exemplifies how indigenous culinary wisdom can address modern nutritional needs while celebrating regional food heritage.

Keywords: Pearl Millet, Bajra Kharwadi, Cultural sustainability, Traditional Food Knowledge

Innovating Vegan Nutrition for Athletes: A Comprehensive Approach to Developing Soya-Based Protein Bar

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ABSTRACT

With the increasing demand for plant-based nutrition in sports, soy protein has emerged as a sustainable and high-quality alternative for athletes. This study aimed to develop and evaluate a soy-based vegan protein bar using soybeans and soymilk powder as primary ingredients. Soy protein, with a protein digestibility-corrected amino acid score (PDCAAS) of 1.00, provides a well-balanced profile of essential amino acids, making it a suitable option for athletes seeking plant-based protein sources. Additionally, soymilk powder offers a lactose-free, cost-effective alternative for individuals with dietary restrictions. Two formulations of the protein bar were developed—one without chocolate essence and one with chocolate essence. Sensory evaluation using a 9-point Hedonic scale revealed a strong preference for the chocolate-flavoured variant, which received the highest mean scores for taste (7.7±0.92), odour (7.7±0.99), colour (7.63±0.92), texture (7.23±1.13), and overall acceptability (7.76±0.56). The preferred variant underwent proximate composition analysis, showing high protein content (21.07 g/100 g), fibre (14.19 g/100 g), carbohydrates (56 g/100 g), fat (7.24 g/100 g), and energy (373 kcal/100 g), with a moisture content of 14.19 g/100 g. The production cost of the bars was also assessed, highlighting their affordability. Furthermore, roasting the soybeans enhanced the bar's sensory attributes while reducing its antioxidant content. This study demonstrates that a soy-based vegan protein bar serves as a sustainable, nutritionally rich, and athlete-friendly supplement, ideal for pre- and post-event consumption.

Keywords: *Athletes, Protein bar, Proximate analysis, Soy protein, Vegan.*

Assessing Smoking Determinants in Students: A Predictive Model Based on Anxiety, Distress, and Sleep Patterns

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ABSTRACT

Smoking behaviour is influenced by various psychological and lifestyle factors, including anxiety, distress, and sleep patterns. Understanding these determinants can help in designing effective intervention strategies for smoking cessation among students. This study aims to assess the relationship between smoking behaviour and key lifestyle factors such as anxiety quotient, distress score, and sleep patterns among students. The study also explores the effectiveness of predictive modeling using statistical and machine learning techniques. Primary data was collected from 200 students enrolled in different courses through a structured questionnaire with uniform scoring criteria. Statistical analysis was performed using logistic regression to examine the association between smoking and selected lifestyle factors. Additionally, advanced machine learning techniques, including decision tree and random forest models, were employed to improve predictive accuracy and identify significant determinants of smoking behaviour. The findings indicate that anxiety quotient, distress levels, and sleep patterns play a crucial role in determining smoking habits among students. Logistic regression results highlight statistically significant associations between these variables and smoking behaviour, while machine learning models provide a robust predictive framework with high classification accuracy. This study demonstrates that lifestyle and mental health factors significantly influence smoking behaviour among students. The use of machine learning techniques enhances predictive capabilities, providing valuable insights for targeted smoking prevention and intervention programs.

Keywords: Anxiety, distress, lifestyle, machine learning, smoking

Nutritional and Functional Properties of Quinoa and Amaranth

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ABSTRACT

Quinoa (Chenopodium quinoa) and amaranth (Amaranthus spp.) are nutrient-dense pseudocereals that have gained global recognition for their nutritional and functional food properties. They are rich sources of high-quality proteins (13-19%) with balanced essential amino acids (particularly lysine), carbohydrates (60-70%) includes significant amount of dietary fiber and resistant starch, lipids (5-9%) such as omega-6 fatty acids and squalene, vitamins, and minerals including iron, magnesium, and zinc, with amaranth showing notably higher calcium levels, making them valuable additions to a balanced diet. Additionally, these grains contain bioactive compounds such as phenolic acids, flavonoids, saponins, and betalains, which contribute to their antioxidant, anti-inflammatory, anti-diabetic, and cardiovascular protective effects. Their gluten-free nature makes them particularly beneficial for individuals with celiac disease and gluten sensitivity. With increasing consumer demand for nutritious and health-promoting foods, quinoa and amaranth have been widely incorporated into various food products, including baked goods, pasta, beverages, and snacks. Their adaptability to diverse climatic conditions also makes them significant for sustainable agriculture and global food security. This paper highlights the nutritional composition, bioactive components, health benefits, and industrial applications of quinoa and amaranth, emphasizing their role as functional foods with immense potential for improving public health and promoting sustainable diets.

Keywords: Quinoa, Amaranth, Pseudocereals, Nutritional composition, Functional properties, Bioactive Compounds, Health Benefits, Sustainable Diet.

Marine Microalgae: The Future of Functional Foods and Sustainability

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ABSTRACT

Rich in nutrients and bioactive substances, marine microalgae are becoming a potential source of functional foods. Some of them are becoming more popular including *Spirulina, Chlorella, Nannochloropsis, Haematococcus pluvialis,* and *Dunaliella salina*. Their popularity is increasing because they contain numerous healthy nutrients, such as protein, polysaccharides, antioxidants, vitamins B12, K, C, and E, and DHA and EPA. They have many health benefits, including reducing inflammation, protecting cells from damage, boosting the immune system, and improving heart and metabolic health. Phycocyanin, astaxanthin, fucoxanthin, and sulphated polysaccharides are bioactive chemicals that come from microalgae and have been the focus of a lot of research lately because they have beneficial health effects. Currently, they are incorporated in functional foods, nutritional supplements, and medications. Moreover, microalgae address global food security and environmental sustainability issues by playing a role as a sustainable substitute for conventional protein and omega-3 sources. Microalgal biomass is being used in plant-based protein substitutes, fortified dairy and bread products, and functional beverages. Biotechnological advances in areas like genetic engineering, precision fermentation, and large-scale cultivation are making microalgal functional components more bioavailable and more efficient to produce. However, resolving issues with cost-effective production, customer acceptance, and regulatory permissions is crucial for its wider commercialisation. Therapeutic uses of marine microalgae in the prevention of chronic diseases, personalised nutrition, and the gut-microbiome interaction will be the subjects of future research. Marine microalgae have significant untapped nutritional and functional possibilities, allowing them to play a crucial part in the development of sustainable nutrition and functional foods in the years to come. Therefore, the research emphasises the present uses of marine microalgae, their advantages, and emerging trends in functional food. Completely harnessing their possibilities for human health and sustainable food innovation depends on further developments in biotechnology, food science, and healthcare.

Keywords: Marine microalgae, functional foods, therapeutic uses, sustainable nutrition, food innovation

Foods Effect Health: Children Who Are Health-Conscious' Perceptions of Functional Foods and Good Eating

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ABSTRACT

"Functional foods," or foods promoted as enhancing health or lowering the risk of disease, are one topic of discussion in the modern eating community. This study examines how children who are health-conscious consumers perceive functional foods in relation to healthy eating by analysing lay understandings of foods that promote health. Eight focus groups with consumers and non-users of cholesterol-lowering products as a particular category of functional foods served as the basis for the article's analysis. The results show that consumers have different interpretations of healthy eating and functional foods. These viewpoints include (1) emphasizing the entire diet, (2) differentiating between functional and healthful foods, (3) the conundrum of whether to eat for enjoyment or health, and (4) considering healthfulness as a "personal" matter. issue, followed by (5) the dual nature of risk in relation to functional foods. The range of viewpoints demonstrates how conceptions of healthy eating and functional foods are intertwined with ideas of scientific knowledge uncertainty, moral implications that dictate what constitutes appropriate eating, and the symbolic importance of food as an intrinsically social issue. Due to their role as role models and their responsibility for buying and supplying functional foods (FFs), parents have a significant influence on the food preferences of young children.

Keywords: fruit, veggies, consumption, parents, kids, and functional foods

Depression and Nutritional Status: Examining Their Association

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ABSTRACT

This study aimed to investigate the relationship between depression levels and nutritional status, along with associated lifestyle factors among adult females. A cross-sectional study was conducted with 150 participants using both online and offline data collection methods. Chi-square tests were employed to analyze the association between depression and various factors including demographics (age), anthropometric measurements (BMI, waist circumference, blood pressure), dietary habits (meal frequency, meal skipping, dietary restrictions), and lifestyle behaviors (smoking, stress eating, physical activity). Four factors demonstrated statistically significant associations with depression: smoking ($p = 0.011$), skipping meals ($p = 0.025$), stress-related eating patterns ($p = 0.006$), and lack of regular exercise ($p = 0.003$). A marginally significant association was observed between age and depression ($p = 0.055$), with individuals aged 18-23 more frequently reporting occasional depressive symptoms. No significant relationships were found between depression and manic-like symptoms ($p = 0.100$), blood pressure ($p = 0.258$), BMI ($p = 0.262$), waist circumference ($p = 0.941$), dietary restrictions ($p = 0.308$), meal frequency ($p = 0.118$), eating out habits ($p = 0.725$), processed/fast food consumption ($p = 0.109$), sugary beverage intake ($p = 0.218$), water consumption ($p = 0.414$), or eating goals ($p = 0.915$). The potential influence of age on depression warrants further investigation. These findings highlight the importance of regular eating patterns, stress management through healthy eating habits, regular physical activity, and smoking cessation in addressing depression, while suggesting that anthropometric measurements and certain dietary preferences may have limited direct impact on depression levels.

***Keywords**:* Depression, Dietary Habits, Female College Students, Lifestyle Behaviors, Nutritional Status

Assessing the Link Between Nutritional Health and Menstrual Cycle Regularity in Female College Students

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ABSTRACT

This study investigated the relationship between nutritional health and menstrual cycle regularity among college students. A total of 151 female college students participated through both online and offline surveys. Statistical analysis was conducted using SPSS 20 software to examine associations between menstrual regularity and various factors including BMI, medical conditions, lifestyle factors, and age. Chi-square tests revealed significant associations between menstrual regularity and BMI ($\chi^2 = 13.67$, $p = 0.001$), medical conditions ($\chi^2 = 18.21$, $p = 0.0001$), and lifestyle factors ($\chi^2 = 7.89$, $p = 0.048$), while age showed no significant association ($\chi^2 = 4.91$, $p = 0.086$). Correlation analysis further confirmed these findings with BMI showing a moderate negative correlation ($r = -0.42$) with menstrual regularity, medical conditions demonstrating a strong negative correlation ($r = -0.58$), and lifestyle factors exhibiting a weak to moderate negative correlation ($r = -0.29$). The results indicate that nutritional status, particularly as reflected by BMI, plays a crucial role in menstrual health among college-age women. These findings highlight the importance of nutritional education and intervention programs on college campuses to promote reproductive health in this population.

Keywords: BMI, female college students, lifestyle factors, medical conditions, menstrual cycle regularity, nutritional status.

Exploring the Link Between Sleep Disorders and Nutritional Status: Implications for Health and Well-Being

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ABSTRACT

This study aimed to investigate the relationship between sleep disorders, specifically difficulty falling asleep, and nutritional status along with related lifestyle factors among adult females. A cross-sectional study was conducted with 150 participants using both online and offline data collection methods. The association between difficulty falling asleep and various factors including anthropometric measurements (BMI, waist circumference, blood pressure), dietary habits (meal frequency, meal skipping, dietary preferences), and lifestyle behaviors (smoking, stress eating, physical activity) was analyzed using chi-square tests. Two factors demonstrated statistically significant associations with sleep difficulties: BMI ($p = 0.043$) and meal skipping behavior ($p = 0.001$). Borderline significant associations were observed with smoking ($p = 0.089$) and stress-related eating patterns ($p = 0.055$). No significant relationships were found between sleep difficulties and age ($p = 0.760$), manic-like symptoms ($p = 0.238$), blood pressure ($p = 0.548$), waist circumference ($p = 0.166$), dietary preferences ($p = 0.776$), meal frequency ($p = 0.305$), eating out habits ($p = 0.442$), exercise routines ($p = 0.702$), fast food consumption ($p = 0.147$), sugary beverage intake ($p = 0.779$), or water consumption ($p = 0.946$). This study suggests that nutritional factors, particularly BMI and meal skipping behaviors, play a significant role in sleep quality. The potential influence of smoking and stress-related eating patterns on sleep difficulties warrants further investigation. These findings highlight the importance of regular eating patterns and weight management in addressing sleep disorders, while suggesting that many other lifestyle factors may have limited direct impact on sleep difficulties.

Keywords: Anthropometric measurement, dietary habits, lifestyle behaviors, nutritional status, sleep disorders.

A Comprehensive Review on Impact of Ascorbic Acid On Cancer Therapy

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ABSTRACT

Cancer ranks among the top causes of death worldwide. According to global cancer statistics for 2024, approximately 20 million new cancer cases were identified in 2022, resulting in around 9.7 million fatalities across the globe. Projections indicate that by 2050, the number of cancer cases could nearly double underscore the urgent need for improved anti-cancer therapies to lower mortality rate. Ascorbic acid, commonly referred to as vitamin C, is an essential water-soluble vitamin that plays a significant role in cancer treatment and various metabolic processes within the body. Its potential antitumor properties have garnered significant interest, functioning as an antioxidant that inhibits the growth and proliferation of cancer cells through the production of reactive oxygen species that specifically target cancer cells and induce apoptosis. Higher doses of ascorbic acid have shown promise in demonstrating anti-tumor activity due to its pro-oxidant property. Additionally, vitamin C may improve cancer immunotherapy by modulating the immune system, influencing epigenetic factors, and regulating cytokine expression, all of which are essential for effective immune responses and better patient outcomes. This study was conducted using various academic databases while adhering to specific inclusion criteria: focusing on documents published between 2015 to 2025, the effects of ascorbic acid on cancer cells, its pharmacological properties, benefits of vitamin supplementation during cancer treatment, and its role in enhancing immunotherapy. This article aims to explore the current research on the role of vitamin C in enhancing immune response during cancer treatment and its overall therapeutic effects.

Keywords: antioxidant, apoptosis, ascorbic acid, cancer, immunotherapy

An Investigation on The Impact Of Nutrition And Mental Health On Working Individuals In The Meerut NCR Region

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ABSTRACT

The relationship between nutrition and mental health has gained significant attention in recent years, especially among working individuals who face unique challenges balancing their professional and personal lives. This study aims to evaluate the nutritional and mental health status of working males and females in the Meerut region, highlighting dietary habits, mental health concerns, and their interrelation. A mixed-methods approach involving surveys and interviews was employed to gather data, and findings underscore the need for targeted interventions to promote healthier lifestyles and improve mental well-being among this demographic.

Keywords: Nutrition, Mental Health, Anxiety, mental health of male and female of Meerut region etc.

Protective Role of Dietary Fibre in COPD Management: A Critical Review

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a chronic lung disease leading to airflow restriction and breathing difficulties. It results from a combination of chronic bronchitis and emphysema. While there is no cure for COPD, it can be managed and treated. The role of diet in the management of Chronic Obstructive Pulmonary Disease (COPD) has received a renewed interest amidst its rising global prevalence. Recent research has underscored the role of functional foods in reducing inflammation and improving lung health among COPD patients. Dietary fibre stands out as an important food constituent related to reduced severity of COPD. The present paper aims to assess the available literature to determine the role of dietary fibre in COPD management. A literature review was conducted using databases such as PubMed, Cochrane Library, Web of Science, and Google Scholar, focusing on studies published between 2010-2024. Evidence suggests that whole grains, which retain essential nutrients like fibres, contribute to a reduced oxidative stress and systemic inflammation, potentially benefiting COPD patients. Examples include whole wheat, barley, buckwheat, millet, oats, and rye. Similarly, fruits, due to their high fibre content, act by supporting lung function by reducing oxidative stress and inflammation through mechanisms like the gut-lung axis, where gut microbiota metabolizes dietary fibre into anti-inflammatory compounds. Fibre-rich diet such as the Mediterranean diet may help in improving lung function in COPD patients, leading to better management and quality of life.

Keywords: Dietary fibre; Chronic Obstructive Pulmonary Disease; whole grains; Gut- Lung axis; Mediterranean diet; Functional foods.

Natural Nutritional Enrichment of soya and groundnut paneer with micro millet extract

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ABSTRACT

Processing of milk to paneer has been found in ancient era as well as in modern day, worldwide and India as well. Paneer is generally prepared from milk of animal origin like of buffalo or cow. Though the foods prepared from plant origin are better tolerated by humans, milk being abundantly available after white revolution was an ideal ingredient for paneer making. Practice of veganism with total exclusion of animal products in the daily consumption has gained a lot of importance these days. Apart from this, lactose intolerance has been critically evident all over the world in round 60% of population and in India the incidences have been increasing from 27% to 60% in different regions of the country. Production of food products excluding lactose and including totally based plant products gains importance in these circumstances. It also decreases the carbon emission in the environment. Tofu prepared from soya has been one of the best replacements to milk paneer. Paneer can also be prepared from groundnut extract. It is a known fact that millets are rich in mineral and fibre along with a good content of protein. A value addition to the panner prepared from soya and groundnut milk using the millet extract has been clearly indicated by low fat, good fibre and equal protein when compared to that of milk paneer. This product gives an additional food product to vegans, those suffering from lactose intolerance as well as public.

Key words: Paneer, Tofu, lactose intolerance, veganism, minor millets.

Positive Impact of Germination & Biofortification On The Content And Bioaccessibility Of Zinc In Sindoor Saal- A Light Bran Folk Rice Variety

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ABSTRACT

Zinc deficiency is a public health concern affecting all age groups globally. Dietary strategies, particularly fortification of staples, are sought after for prevention and management. Studies exploring folk rice varieties as vehicles of micronutrient fortification are sparse. In the current study, germination and germination-based biofortification were evaluated for their impact on zinc content and bio accessibility. Sindhoor Saal—a light bran, scented folk rice variety of India, traditionally known for its benefits to women's health, was selected. Fortification was carried out by germinating whole rice grains under optimized conditions for 72 hours, with zinc sulfate as a fortification (100 mg/L). The germination process significantly ($p<0.05$) improved the total and bioaccessible zinc content. Biofortified samples recorded a 14-fold increase in total and 2.2-fold in bio accessible zinc content. Iron and zinc are divalent cations that compete for absorption. An improvement in iron accessibility was observed with germination, while only a slight reduction was observed in the fortified sample, indicating a better outcome by the current method employed. The results indicate the beneficial role of adapting germination for fortifying whole rice grains, as it is proven to reduce phytates and polyphenols that limit iron and zinc bio accessibility. The current study indicates the potential of germination-based zinc fortification to effectively enhance zinc content and bio accessibility. In line with the sustainable development goal 3, this strategy may aid in prevention and management of zinc deficiency among the population with manifold benefits, including enhanced immunity, lower mortality, lower risk of non-communicable diseases, reproductive issues, and anxiety.

Keywords: Light bran folk rice, Germination, Zinc deficiency, Zinc biofortification and Bioaccessibility

Unlocking The Potential of Ash Gourd

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There are millions of plant species that inhabit our planet, which provides us with an abundance of nutrition and medicinal values. These consist of several hundred species of gourds with significant health benefits that belong to the family of plants called Cucurbitaceae, which are recognized by their twisted and climbing vines. Particularly, the ash gourd, with the scientific name *Benincasa hispida* is particularly prized for its diverse nutritional and medicinal values. It is a tall climbing herb, native to Asia and cultivated in large quantities throughout flat areas as well as in hilly regions, with cultivation taking place up to an elevation of 1200m in India. *Benincasa hispida* contains a high concentration of vitamins, natural sugars, amino acids, organic acids, and important minerals. In Phytochemical investigations of *Benincasa hispida* fruits, it contained a variety of important compounds, including flavonoids, volatile oils, glycosides, saccharides, , carotenes, proteins, vitamins, minerals, ß-sitosterin, and uronic acid. The plant exhibits various medicinal properties, with effects that include analgesic, antiasthmatic, diuretic, nephroprotective, antidiabetic, hypolipidemic, antioxidant, and anti-inflammatory activities. In addition to it, it has demonstrated effects on the central nervous system, including anxiolytic, muscle-relaxing, and antidepressant characteristics, as well as potential benefits in managing Alzheimer's disease. In ayurveda, it is appreciated for its nutritional benefits and healing properties, and it has historically been used to address conditions like ulcers, epilepsy and mental health concerns. These medicinal characteristics, along with its antioxidant properties make it a potential subject for future studies and investigation.

Keywords: Ash gourd, *Benincasa hispida*, herbs

Development And Sensorial Evaluation of Modified Traditional Breakfast Recipes for The Management Of Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)

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ABSTRACT

Metabolic dysfunction-associated steatotic liver disease (MASLD) has become a significant global health concern, closely linked to poor dietary habits. Traditional breakfast recipes, widely consumed in various cultures, often feature high-fat or high-sugar ingredients that may worsen the condition. given the importance of breakfast in replenishing energy, stabilizing blood sugar levels, and providing essential nutrients, modifying these recipes to align with MASLD dietary principles can support liver health while preserving cultural dietary practices. This study aims to identify popular traditional breakfast recipes through a literature review and market analysis and modify them by reducing fats and sugars while incorporating hepatoprotective ingredients such as fibre-rich foods and antioxidants. Sensory evaluation was conducted using a 9-point hedonic scale, where semi-trained panellists assessed appearance, taste, aroma, texture, color, and overall acceptability. Nutrient profiles of the modified recipes were analyzed using Dietsoft software (version 1.0) to ensure compliance with MASLD dietary guidelines. This approach sought to develop healthier breakfast alternatives that retain cultural relevance while promoting improved dietary habits and liver health. The modified breakfast recipes were evaluated by twenty semi-trained panellists. Fifteen panellists expressed high levels of acceptability across sensory parameters, including appearance, taste, texture, aroma, and colour the modified Quinoa & Oats Idli demonstrated the highest overall acceptability (8.6±0.5), significantly differing in appearance, aroma, texture, flavour, taste, and overall acceptability from other breakfast recipes evaluated ($P>0.05$). The inclusion of hepatoprotective ingredients such as quinoa and oats, along with the reduction of unhealthy fats and sugars in the modified breakfast recipes, emphasized their practical application for liver health. Quinoa & Oats Idli demonstrated high levels of dietary fibre (3.5 g), low fat (2.0 g), and a moderate glycemic load (8), supporting improved insulin sensitivity and reduced hepatic fat accumulation. Similarly, Brown Rice Dosa provided essential nutrients, including complex carbohydrates (22.0 g) and moderate protein content (4.8 g), with a slightly higher glycemic load (10). Iddyappam, with a balanced macronutrient distribution, fibre (3.0 g) and fat(1.8 g), maintaining a glycemic load (7). These observations highlight the Quinoa & Oats Idli as having the most favourable sensory and nutritional attributes, making it a promising dietary intervention for MASLD management. The use of hepatoprotective ingredients and reduced fats and sugars emphasized their practical application for liver health. The reformulated recipes demonstrated improved nutritional profiles while maintaining sensory appeal, highlighting their potential as culturally relevant dietary interventions for MASLD management.

Keywords: MASLD, liver health, dietary interventions, traditional breakfast recipes, sensorial evaluation.

Yellow kiwi: from by-product to food ingredients. Phytochemical and nutritional potential of the peel and pomace in functional food

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Abstract

The agri-food industry generates waste or by-products that are discarded without proper use. According to the Food and Agriculture Organization of the United Nations (FAO), approximately one-third of the food produced for human consumption is wasted annually. Among these by-products, the peel (YKS) and the pomace (YKB) of the yellow kiwi (*Actinidia chinensis*) are highlighted due to their nutrients and health-beneficial compounds such as phenolic compounds, pigments, and dietary fibers. The valorization of these by-products represents a sustainable alternative aligned with trends in the circular economy. In this study, the nutritional and phytochemical characterization of YKS and YKB was conducted to assess their potential as functional ingredients for new food products. Proteins, lipids and minerals were analyzed following the AOAC International standards. For chemical characterization, heat-assisted extraction was applied followed by a metabolomic study by HPLC-ESI-QqQ-MS/MS. The results showed that YKS and YKB are a rich source of protein, with YKB standing out for its higher content of proteins (6.12 g/100 dw) and lipids (5.72 g/100 dw), of which 44% corresponds to polyunsaturated fatty acids. On the other hand, YKS stood out for its content in minerals such as K, Ca, P, Mg, Na, and Fe. The metabolomic analysis revealed that YKS contains 42.5% phenolic acids and 31% flavonoids, while YKB is composed of 60% phenolic acids, 24% other polyphenols, and 16% flavonoids. These findings support that YKS and YKB are natural sources of bioactive compounds with antioxidant properties, which could have applications in the food, pharmaceutical, and cosmetic industries.

Keywords: *Actinidia chinensis*, by-product, bioactive compounds, nutritional and phytochemical characterization.

BIOFORTIFICATION OF FOOD CROPS THROUGH AGRONOMICAL INTERVENTIONS TO ALLEVIATE HIDDEN HUNGER IN HUMAN BEINGS

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Globally, micronutrient deficiency is an utmost serious general public issue for agricultural scientists, food technologists, nutritionists as well as policy makers. Among micronutrients, zinc and iron are the foremost deficient nutrients among the global population which impacts human health adversely. Various plant improvement techniques have been applied to enhance bioavailability of these elements in the food crops, but breeding approaches are tedious and need immense resources. Among these, biofortification through agronomical interventions is considered to be the cheaper as well as sustainable to augment the bioavailability of these essential micronutrients in the food crops especially in their economical and edible part without compromising their yield potential. This approach is an affordable and practical for implementing in the commercially adopted cultivar of any field or food crop to mitigate zinc and iron deficiencies through providing food containing higher amounts of these nutrients. For attaining nutritional security, understanding comprehensively the agronomic biofortification practices for various staple food crops is need of the hour. With augmented micronutrient contents, agronomic biofortification can also enhance crop yields and other related quality parameters; eventually, this technique has an encouraging impact on health as well as socioeconomic status of various stakeholders. Biofortification of staple food crops offers a cheaper and better sustainable solution to address the micronutrient deficiencies in the human body to sustain good physical and mental health.

Keywords: Nutritional security, Human health, Malnutrition, Micronutrient, Zinc deficiency

Butterfly Pea Flower (*Clitoria Ternatea*): A Hidden Superfood for Health and Wellness

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ABSTRACT

The Butterfly pea flower, also known as *Aparajita,* has been used traditionally in Ayurvedic medicine for its health benefits. Butterfly pea flower is known for its striking blue and purple bloom. This review article aimed to analyze the physico-chemical and nutritional composition of butterfly pea flower, providing insights into its functional food. The presence of anthocyanins, particularly in the blue and purple flowers, highlights its potential as a natural pigment and antioxidant source. Its nutritional and phytochemical content makes it a valuable resource for medicinal and nutritional applications. This comprehensive review contributes to the field by bridging traditional knowledge with modern nutritional science, offering future studies focused on the commercialization of butterfly pea flowers as functional foods and natural therapeutic products.

Keywords: Anthocyanin, Antioxidant, Ayurvedic medicine, Butterfly pea flower, Functional food

Processed Kodo Millet Flour: A Nutrient-Rich Functional Food for Sustainable Nutrition and Health

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ABSTRACT

Kodo millet (*Paspalum scrobiculatum*) can also be referred to as cow grass, rice grass, ditch millet, Native Paspalum, or Indian Crown Grass. One of the world's ancient grains which is drought-resistant, originated in Africa and cultivated in India a few thousand years ago. It grows in India, Pakistan, the Philippines, Indonesia, Vietnam, Thailand, and West Africa. It is a popular food source in the Deccan plateau of India (Gujarat, Karnataka, and portions of Tamil Nadu), as well as in Maharashtra, Odisha, West Bengal, Rajasthan, Uttar Pradesh, and the Himalayas. It is also traditionally consumed as a health and vitality meal in rural India. Kodo millet is a rich source of nutrients and minerals. It also includes antinutritional components that may limit its utilisation; however, these can be minimised through proper processing procedures to improve its dietary uses. Soaked kodo millet possess high nutritional value when compared with normal kodo millet. Kodo millet contains a high concentration of phenolic chemicals renowned for their antioxidant qualities. As a result, this research provides useful information on the effect of soaking on kodo millet, including changes in nutritional composition, mineral profile, and antioxidant activity.

Keywords: functional food, Kodo millet, minerals, nutrition, soaking

Nutritional and Functional Enhancements in Colored Sorghum Cultivars Through Popping: Impact on Bioactive Compounds and Antinutritional Factors

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ABSTRACT

Sorghum is a nutrient-dense cereal which is gaining recognition as a functional food because of its high fiber content, antioxidants, and bioactive phenolic compounds. However, the presence of antinutritional factors (ANFs), such as tannins and phytic acid, can reduce its nutritional benefits by interfering with minerals such as iron and zinc which limits their bioavailability. This study underscores the impact of popping on the chemical composition, bioactive composition, and ANF content of three colored sorghum genotypes viz. Parbhani Moti (white), GP-1539 (Red), GP-2017-5 (Yellow). The popping method was optimized by varying soaking durations (1–3 min at 90°C) and conditioning times (6–8 hrs) while maintaining a constant temperature of 170°C. Post-popping analysis revealed a notable increase in dietary fiber content, while the total phenolic content (TPC) and total anthocyanin content (TAC) exhibited reductions from 289.20 mg/100 g to 28.92 mg/100 g and 53.30 mg/100 g to 21.32 mg/100 g, respectively. Furthermore, popping significantly reduced ANFs, with tannins decreasing from 0.30–0.34 mg/100 g to 0.08–0.13 mg/100 g and phytic acid levels dropping from 8.80 mg/100 g to 6.16 mg/100 g. These reductions improve the bioavailability of essential micronutrients, making popped sorghum a more nutritionally accessible and functional ingredient for its exploration into different Value-added food applications. The findings suggest that processing techniques such as popping can enhance the utility of sorghum in health-oriented formulations, particularly in snack foods, where its small, crisp texture offers advantages over traditional popped grains.

Keywords: Antinutritional Factors, Bioactive Compounds, Bioavailability, Functional Foods, Nutritional Popping, Sorghum.

A Comprehensive Review on Functional Beverages Incorporated with Cherry (Prunus Avium) And Peach (Prunus Persica) In Health Enhancements

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ABSTRACT

The unique creation of food items with a health purpose which focuses on functional development of confections and several health benefit-based drinks. This review analyses natural fruit-based drinks made from fruits like cherries (*Prunus Avium*) and peaches (*Prunus Persica*) are thoroughly reviewed with an emphasis on their nutritional makeup, antioxidant capabilities, and potential as healthier substitutes for conventional fruit-based drinks. At the same time this review also explores in detail the functional nutritive and phytonutrients of cherries (*Prunus Avium*) and peaches (*Prunus Persica*) in brain health, offering information on their neuroprotective and cognitive-boosting qualities. The goal of this research is to develop drinks using natural fruit ingredients that are high in nutrients, have a pleasing taste, improve water and electrolyte balance, provide the calories needed after intense exercise, and have extra electrolytes, carbs, prebiotic fibre, and protein. In order to provide health benefits, creative formulations, and environmentally friendly processing techniques, this studies collectively increase our understanding of the natural elements included in functional foods. The study concept can be used to improve the flavour and texture of fruit-based beverages. In addition to using healthy components, efforts have been made to minimise the number of artificial sweeteners, preservatives, colours, and flavours in them. The purpose of this review is to provide a thorough analysis of the ingredients in health drinks and innovation for future developments in this area for health-conscious individuals who require healthy products, particularly to boost increase immunity.

Keywords: Fruit based drinks, Cherries, Peach, Antioxidant, Performance Enhancement, Functional Food

Nutritional Assessment and Dietary Habits of Young Adults with Night Eating Syndrome

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ABSTRACT

Night eating is a primary behavioural characteristic of Night Eating Syndrome (NES), a condition defined by increased food intake in the evening, reduced morning appetite, and sleep disturbances. Research has linked night eating habits (NEHs) to a higher risk of chronic conditions such as obesity, metabolic syndrome, and gastrointestinal disorders. This study aimed to investigate the relationship between NES and body composition in young adults. A cross-sectional study was conducted using a self-designed questionnaire and Bioelectrical Impedance Analysis (BIA) parameters. Data collection involved measuring BIA parameters, including protein, minerals, body fat mass, skeletal muscle mass, and percent body fat. Participants were selected using non-probability convenience sampling, and statistical analysis was performed using SPSS 25.0. The study included 150 participants, with an average height of 165.0 cm (SD = 9.5), mean weight of 65.0 kg (SD = 12.8), and a mean BMI of 24.0 (SD = 3.9). The mean protein level was 9.0 (SD = 2.2), mean mineral level was 3.2 (SD = 0.7), mean body fat mass was 22.0 kg (SD = 7.5), mean skeletal muscle mass was 24.5 kg (SD = 6.9), and mean percent body fat was 30.0% (SD = 9.8). Findings suggested that participants' eating behaviours were negatively influenced by prolonged screen time. Those who spent excessive time on screens frequently consumed energy-dense snacks such as fast food, processed snacks, sugary desserts, salty treats, and caffeinated beverages.

Keywords: Bioelectrical Impedance Analysis, Body Composition, Night Eating Syndrome, Night Eating Habits, Obesity

A Comparative Study of AI-Generated Personalized Meal Plans Versus Traditional Dietary Guidelines for Weight Management

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ABSTRACT

The increasing occurrence of obesity and weight-related health issues has heightened the necessity for creative dietary management techniques. AI-driven meal planning has emerged as a groundbreaking method, delivering personalized, data-informed solutions customized to individual needs. This paper contrasts AI-generated meal plans with traditional dietary guidelines concerning weight loss, assessing effectiveness, practicality, and user satisfaction. AI-driven plans utilize algorithms, machine learning, and real-time analytics to enhance macronutrient distribution, adjust dynamically to lifestyle shifts, and connect with wearable devices to promote adherence. These attributes increase accuracy, engagement, and responsiveness. On the other hand, conventional dietary guidelines, based on population-centered research and clinical knowledge, offer standardized yet evidence-supported recommendations that emphasize calorie control, balanced nutrition, and portion management. Although less individualized, they gain from their simplicity, credibility, and the supervision of healthcare professionals who account for psychological, social, and cultural dietary considerations. This study emphasizes the strengths of both approaches. AI shines in personalization, convenience, and scalability, particularly for those who are tech-savvy, yet encounters obstacles such as dependency on data, oversimplification of dietary habits, and concerns regarding privacy. Traditional methods maintain their value via expert oversight and human interaction but may lack flexibility and engagement. User satisfaction differs; with AI boosting motivation through interactive reward- based engagement, whereas conventional strategies offer emotional support. The paper highlights the promise of hybrid models that merge AI technology with professional expertise for the best results. A well-rounded combination of both strategies could improve personalization, efficiency, and sustainability in weight management, providing insights for dietitians, healthcare practitioners, and policymakers on the evolving role of AI in nutrition science.

Keywords- Artificial Intelligence, Personalized Meal Plans, Obesity, Weight loss, Machine learning, Nutrition Science

Impact of Black Pepper (Piper nigrum) Powder on Lipid Profile Parameters in Non-Alcoholic Fatty Liver Disease Patients

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ABSTRACT

Non-alcoholic fatty liver disease (NAFLD) is closely associated with dyslipidemia, a critical risk factor for cardiovascular diseases and metabolic disorders. This study examines the effects of supplementation of black pepper (Piper nigrum) which contains piperine a bioactive compound as its prominent constituent, on lipid profile parameters in NAFLD patients over 12 weeks. A randomized, double-blind, placebo-controlled trial was conducted with 170 clinically and radiologically diagnosed NAFLD patients. Participants were randomly allocated into a piperine supplementation group (n=85) and a placebo group (n=85). Lipid profile parameters, including total cholesterol, triglycerides, low-density lipoprotein (LDL), and high-density lipoprotein (HDL), were measured at baseline and post-intervention using enzymatic colorimetric analysis. The piperine group exhibited a significant reduction in total cholesterol, triglycerides, and LDL, along with a marked increase in HDL levels, whereas the placebo group showed no significant changes. Percent Changes in Lipid Profile (Piperine Group): Total Cholesterol ↓15.13%, Triglycerides ↓44.94%, LDL ↓21.58%, HDL ↓3.39%. The findings suggest that piperine supplementation could be an effective adjunct in managing lipid profiles in NAFLD patients, potentially reducing dyslipidemia-related complications. Further studies are required to assess long-term safety and underlying mechanisms.

Keywords: MASLD, Fatty liver, Piperine, Cholesterol, triglycerides, Dyslipidemia.

The Impact of Maternal Dietary Patterns on Pregnancy Outcomes

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ABSTRACT

Maternal nutritional status during pregnancy affects the mother's health as well as the health of the baby during pregnancy and after delivery. Diet and nutrient deficiency analysis depends on the diet consumed by pregnant women. Dietary pattern analysis to understand maternal nutritional status and pregnancy outcomes is more useful in current time. Nutrition is source of energy which is necessary for all types of human activities. A balance diet consists of macro and micronutrients as combination. while nutritional deficiencies include serious forms of nutrient deficiency nutritional biomarkers such as Folate, Vitamin B, C, D, Selenium, Copper etc, intake and diet can be used to asses risk. A part from this micronutrients like Iron, Zink, Iodine, and Vitamin A can be studied through dietary patterns. This review examined articles about the relationship between dietary patterns and their effects on pregnancy outcomes.

***Keywords**:* dietary pattern, pregnancy, nutritional deficiency, medical reports.

Development Of Gluten-Free Pasta Using Teff And Rice Flour: A Study On Nutritional, Functional, And Sensory Properties

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ABSTRACT

Teff (Eragrostis tef) is a highly nutritious, gluten-free ancient grain that has gained global attention for its potential in gluten-free pasta formulations. This review examines the functional, nutritional, and structural roles of teff flour, rice flour, and psyllium husk in the development of gluten-free pasta. Teff flour enhances protein, fiber, and mineral content, while rice flour provides a smooth texture and neutral taste. Psyllium husk acts as a hydrocolloid, improving dough elasticity and water retention, which are critical in the absence of gluten. Comparative nutritional analyses indicate that teff-based pasta is superior to conventional wheat pasta in fiber density, iron content, and glycemic control, making it an excellent alternative for individuals with celiac disease and those seeking healthier dietary options. However, challenges such as poor dough cohesion, high cooking loss, and sensory acceptance persist. Strategies such as optimized blending ratios, processing modifications, and natural additives are proposed to enhance pasta quality. Future research should focus on refining processing techniques, improving sensory appeal, and expanding market acceptance. The findings underscore the significance of teff flour as a functional and sustainable ingredient for gluten-free pasta innovation.

Keywords: Teff flour, gluten-free pasta, rice flour, psyllium husk, glycemic index, dietary fiber, celiac disease

Exploring The Role of Ashoka Tree Bark in Modulating PCOS: Current Evidence and Future Directions

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ABSTRACT

PCOS (*Polycystic Ovarian Syndrome*) is a hormonal disorder affecting women of reproductive age. PCOS results in hormonal imbalances, amenorrhea, hirsutism, polycystic ovaries, anovulation, and infertility. There are traditional treatments for PCOS, but they show many side effects, inducing a growing interest in natural remedies for the treatment of PCOS. The Ashoka tree, or Ashokbriksh (*Saraca asoca*), belongs to the family *Caesalpiniaceae* and is used for various gynecological conditions because of its stimulating effect on the endometrium. Ashoka tree bark possesses many therapeutic properties, including anti-androgenic, anti-inflammatory, anti-cancer, anti-diabetic, insulin resistance, and hormonal balancing properties. This review seeks to explore the existing evidence on the potential role of Ashoka tree bark in managing PCOS, focusing on enhancing ovarian health. The relevant literature for this review has been searched from academic databases such as PubMed, Mendeley, Web of Science, Google Scholar, and Science Direct. This study covered the articles that were published between 2000 and 2024 to include the recent findings. Research suggests that Ashoka tree bark contain bioactive compounds (flavonoids, saponins, tannins, and glycosides) that have anti-inflammatory, anti-androgenic, and antioxidant effects that help in managing PCOS. Ashoka bark can diminish oxidative stress and reduce inflammatory markers, which may lead to the normalization of ovarian function and then reduce the chances of cyst formation. Ashoka is used as the best uterine tonic as it regulates menstrual cycles and lowers miscarriage situations. The review includes the therapeutic properties of Ashoka tree bark for managing PCOS.

Keywords: PCOS, Ashoka tree bark, Anti-androgenic, *Saraca asoca*, Hormonal regulation.

Revitalizing Gluten-Free Brownies with *Lepidium SATIVUM* L. Seed Mucilage as a Fat Replacer.

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ABSTRACT

Gluten has this unique sticky property which makes it most suitable for use in bakery. People with gluten-related disorders follows gluten-elimination diet, only practice which can help their health. Several studies have been found to use hydrocolloids, gums, gels in their food composition as a gluten substitute. Seed mucilage is something which imitate the properties of gluten. Garden Cress *(Lepidium sativum)* is a plant with potent medicinal properties. It has an extensive variety of nutritional and bioactive components. These seeds are an impressive source of protein, unsaturated fatty acids, minerals and vitamins. Today, seed mucilage has a variety of application in the food industry. In this research investigation extraction of mucilage is done from garden cress seeds by thermal technique. The extracted mucilage (25%, 50%, 75%, 100%) was consolidated into the gluten free brownies which were developed using soyabean, amaranth and barnyard millet flour for the fat supersession. Further, the nutritional and physiochemical properties were analyzed using AOAC methods. The fatty acid profiling was estimated by GC-FID technique and organoleptic parameters using 9-point hedonic scale. Relative analysis was done against a gluten-free control brownie sample. Addition of *Lepidium sativum* seed mucilage found to have a positive quality elevation in nutritional profile; alpha-linolenic acid , linoleic acid and oleic acid were the main fatty acids found. Organoleptic profile with 8.1 overall acceptability was intensively influenced by the level of fat supersession. Thus, garden cress seed mucilage can be considered as a novel fat replacer in gluten free bakery items.

Keywords: Garden cress, Gluten-free, Mucilage, Fat replacement, Nutrition, Health

Glycaemic Optimised Chocolate for Diabetic Patients

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ABSTRACT

Diabetes is a chronic health condition that impacts the body's ability to convert food into energy. The body breaks down most of the food into sugar (glucose) which is then released into the bloodstream. When the blood sugar level rises, insulin is released by the pancreas. Diabetes is characterised by insufficient insulin or the body's inability to use it well. When there isn't enough insulin or cells stop responding to insulin, too much blood sugar stays in the bloodstream. Glycemic Optimised Chocolates are diabetic friendly as they are filled with functional food ingredients including spinach powder, moringa leaf powder, seedless amla powder, fenugreek powder, beetroot powder, date paste etc. Each ingredient has its own properties, such as quercetin in moringa leaf powder, micronutrients in beetroot powder, vitamins in seedless amla powder, fiber in fenugreek powder as well as potassium and calcium in date paste. Using sugar-free dark chocolate can be advantageous as it is an antioxidant. Polyphenols in dark chocolate can improve insulin sensitivity or enhance the performance of insulin in the body. Such improved insulin sensitivity may delay, or even prevent, the onset of diabetes which may prevent further complications associated with diabetes such as cardiovascular and heart diseases, kidney damage, eye and foot problems.

Keywords: Antioxidants, Diabetes, Functional Food, Insulin

Assessment Of Dietary Habit and Physical Activity Among Young Adults in Greater Noida

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ABSTRACT

Young adulthood (18-25 years) is a crucial phase for establishing lifelong health behavior. Poor dietary habits and insufficient physical activity contribute to the rising prevalence of non-communicable diseases such as obesity, diabetes and cardiovascular disorders. This cross-sectional study assessed the dietary habits and physical activity levels of 100 young adults in Greater Noida, Uttar Pradesh, using validated questionnaires. Statistical analysis was performed using Microsoft Excel. Results showed that 67% followed a vegetarian diet, yet 93% lacked awareness of balanced nutrition. Fifty percent skipped breakfast three to five times per week, and 83% consumed junk food primarily due to taste preference. Despite 50% checking expiry dates, only 23% read nutrition label. Regarding physical activity, 87% engaged in low intensity activities, while only 23% participated in moderate exercise. Seven percent reported no physical activity with major barriers including lack of time (50%) and lack of motivation (37%). These findings highlight unhealthy dietary habits and inadequate physical activity levels among young adults, increasing the risk for lifestyle-related diseases. Implementing targeted interventions such as nutrition education and structured physical activity programs is essential to promote healthier lifestyles.

Keywords: Dietary habits, non-communicable diseases, nutrition, education, physical activity, young adults.

Exploration of Antidiabetic Potential of *Pterocarpus marsupium*: A Review

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ABSTRACT

Diabetes Mellitus is a lifestyle disorder affecting many individuals around the globe, which increases the requirement of safe and alternative herbal medicine for the prevention and management of such diseases. *Pterocarpus Marsupium* is a herbal plant found in India and Sri Lanka, widely known for its Therapeutic and Nutritional Properties. This plant exhibits a diverse range of pharmacological properties that are proven to be valuable components of traditional home remedies for managing various human diseases, as it is rich in bioactive compounds such as flavonoids, tannins, and polyphenols. This review aims to analyze the potential of *Pterocarpus Marsupium* in the Management and Prevention of Diabetes. With regard to methodology, various scientific databases, such as PubMed, Google Scholar, and Cochrane, were used as search engines. A total of 15 articles were included in the results. The search terms used were "*Pterocarpus Marsupium*", "Diabetes Mellitus," "Type 2 Diabetes," "Prediabetes," etc. The results revealed that the plant holds potential antidiabetic properties as it can hinder the activity of several enzymes involved in glucose metabolism. The High Antioxidant profile of this plant is also beneficial for the management of diabetes. Pterostilbene, as the prime component of this herb, has shown hypoglycaemic activity in various research. The study concludes that *Pterocarpus Marsupium* has hypoglycaemic potential. As the available literature is limited, future studies are required to establish the required dosage, ensuring efficacy and safety. Comprehensive clinical research is essential to make this herb available for human use as a natural alternative to Western medicine.

Keywords: Diabetes, *Pterocarpus Marsupium*, Herbs, Prediabetes

Beetroot Pomace: A functional additive for muffins

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ABSTRACT

Beetroot pomace are generated from beetroot's juice and colourant industries @15-30% (w/w). The valuable compounds (phenols, favanoids, betalains) entrapped in this waste, can be used as a source of fiber, antioxidants and natural colourant in bakery products since convenient foods with phytonutrient benefits are in high demand. Due to thermo sensitivity of pigment, colour of beetroot pomace disappears at higher temperature (>60^{o}C). Detailed stability study on betalains pigment showed that sucrose at 45% w/w level can stabilize this pigment (betalains). Therefore, functionality of beetroots was decided to be delivered through candied beet root pomace as a source of fiber, antioxidants and colourants in bakery product (muffins). It was clearly evident from the findings that a well-accepted muffin with goodness of beetroot can be developed by replacing 15% of wheat flour from stabilized pomace powder. The optimized product had darker reddish tinge as compared with control due to natural reddish tinge provided by candied beet root pomace powder. This inclusion enhanced the antioxidant potential of the product through enhanced betalains, flavonoids and phenolic content which further confirmed through high DPPH inhibition and reducing power values. Microbial examination along with sensory and textural attributes showed that the optimized product can be consumed well up to 9th days of storage in polypropylene packaging material. The developed product contained almost similar calorific value than control (389.84 v/s 381.48 Kcal per 100g) and less fat content (~37.5 percent lower than control).

Keywords: Antioxidant determination, Beetroot Pomace, Microbial safety, Muffin, Polypropylene

Development Of Active Vitamin B_{12} Rich Ready To Drink Composite Fruit Beverage

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ABSTRACT

Vitamin B_{12} is an essential vitamin, found naturally in foods of animal origin (viz. meat, fish, eggs, and dairy products). Only a few microorganisms and algae synthesise vitamin B_{12} in nature. In this study attempts were made to produce Vitamin B_{12} using *Propionibacterium frudenreichii* ssp. *Shermanii*. Indian population, with largely vegetarian food habit, is more prone to harbour deficiency of B_{12}. Hence, affordable and sustainable dietary sources of B_{12} are needed to be developed to ensure sufficient intake of B_{12}. Ready to drink beverages are widely accepted by the population of all age groups and they could be most ideal vehicle to assist in nutritional rehabilitation of essential nutrients. *P. shermanii* is used for commercial production of vitamin B_{12}. The *P. shermanii* was inoculated into the media prepared using cereal malt flour, dried milk solids and incubated at different fermentation conditions. The media incubated for 72/72 h under anaerobic/aerobic conditions produced 8.21 ± 0.07 µg of B_{12} per 100g of fermented mass. Optimization of ingredients for B_{12} rich fruit beverage was carried out using D-Optimal mixture design technique and the product was evaluated for sensory, physico-chemical and rheological properties. Optimization of processing parameters was carried out using response surface methodology. Formulation containing 5% B_{12} concentrate, 13% pineapple pulp, 11% sugar, and processed at 90º C for 5 minutes and homogenized at 15000 rpm for 3 minutes produced sensorily superior product. Developed product has 1.48 µg of B_{12} per 200ml of serving size and meeting 62% of RDI for B_{12}.

Keywords: Vitamin B12, fruit beverage, sustainable dietary sources, microorganisms

Development and Impact of Ragi-Based Functional Mayonnaise Enriched with Ashwagandha and Moringa: A Sustainable Plant-Based Alternative

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ABSTRACT

Mayonnaise, an emulsified condiment with 70–80% oil, is valued for its rich texture and flavor but raises health concerns due to high fat, low protein, raw egg yolks, microbial contamination, and limited shelf stability. Rising consumer demand for healthier, allergen-free alternatives has driven innovation in functional food formulations. This study focuses on the development of a ragi-based mayonnaise fortified with avocado, ashwagandha, and moringa. These bioactive-rich ingredients improve nutrition, extend shelf life, and offer a plant-based, functional alternative aligned with dietary preferences and food safety. Ragi milk was extracted by soaking cleaned ragi seeds (1:3 distilled water) for 8–12 hours, grinding with water (1:4), straining, and pasteurizing at 72°C for 15 seconds before cooling below 10°C. For mayonnaise preparation, peeled, de-seeded avocados were blended into a smooth pulp, while tragacanth gum was hydrated (1:10) at 60°C for 1 hour. The pulp, ragi milk, vinegar, spices, and gum were homogenized at 2,000 rpm with gradual oil addition, followed by sensory and nutritional evaluation. The developed mayonnaise exhibited excellent sensory qualities—creaminess, flavor, and texture—along with high antioxidant activity from moringa and ashwagandha. Proximate analysis showed reduced fat, enhanced protein, and increased dietary fiber due to ragi and avocado. With a shelf life of over 40 days, this preservative-free innovation provides a sustainable, health-oriented, functional, allergen-free, and plant-based alternative to traditional mayonnaise.

Keywords: Functional Food, Mayonnaise, Phytochemicals, Plant-based.

Assessment Of Knowledge, Attitude, And Practice Towards Healthy Dietary Habits Regarding Anaemia Among College-Going Students Of Greater Noida

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ABSTRACT

Anaemia remains a prevalent health issue among college students, impacting their academic performance and daily activities. This study evaluates the knowledge, attitude, and dietary habits of students in Greater Noida regarding anaemia prevention. A cross-sectional survey was conducted among 210 students aged 18–26 years using a structured questionnaire. The findings reveal that while 87.1% of students were aware of anaemia, only 62.4% correctly identified iron deficiency as its primary cause. Although 71.9% acknowledged its effect on academic performance, just 40.9% regularly consumed iron-rich foods. Additionally, 54.3% reported consuming tea or coffee after meals, which may inhibit iron absorption. Gender differences were evident, with 38.2% of females having a history of anaemia compared to 19.8% of males. Among vegetarians, 28.4% met adequate iron intake, whereas 53.2% of non-vegetarians had sufficient iron consumption. Furthermore, 68.5% of participants expressed interest in nutritional awareness programs. These findings emphasize the importance of targeted educational initiatives to promote healthier dietary habits and reduce anaemia risk among college students.

Keywords: anaemia, awareness, college students, dietary habits, nutrition

Nutritional Knowledge, Attitude and Practices Among Families in Children with Cancer

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ABSTRACT

Malnutrition in cancer results from an imbalance between nutritional intake and needs, often worsened by cancer treatments such as chemotherapy, radiation, or surgery. Lack of awareness, dietary misconceptions, and unnecessary restrictions further contribute to childhood malnutrition. The study was conducted from January to December 2024 at Max Super Specialty Hospital, Saket New Delhi aimed to evaluate the nutritional knowledge, beliefs, and food-related practices among families of 22 newly diagnosed paediatric cancer patients using the Knowledge, Attitude, and Practices (KAP) questionnaire. Findings revealed that 26% of families were unaware of malnutrition, 33% relied on the internet for nutritional advice, and 50% were unaware of the risks of inadequate nutrition during treatment. Many associated red and orange foods with increased haemoglobin levels, while 90% believed protein supplements were harmful. These gaps in knowledge and misconceptions highlight the need for targeted nutritional education programs to improve dietary practices, support faster recovery, and enhance treatment outcomes in pediatric cancer patients.

Keywords: Malnutrition, Children, Cancer, Nutrition, Knowledge

Meeting The Changing Protein Needs of Populations

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ABSTRACT

The increasing and changing need of protein in diet along with the rising population of humans has created a need to reassess our requirements and the sources we have. The increasing concerns over climate change, malnutrition, changing dietary patterns, etc. needs to be focused upon. The need for alternate and efficient protein sources is urgent. Alternative proteins require innovation in production, cost management, and consumer acceptance. Nowadays plant-based diets are gaining popularity due to ethical and environmental concerns but more research is needed to optimize nutrition. As the world's population is rising, increasing food demand will put immense pressure on resources. We need sustainable solutions to meet the changing protein needs of populations. On one hand, rising incomes and urbanization are driving greater demand for nutrient-rich foods; on the other hand, people struggle to meet their basic nutritional needs. To deal with the overconsumption, malnutrition, environmental impact, changing dietary preferences and needs, we need a sustainable food system that balances nutrition, resource efficiency, and environmental impact. We need sustainable dietary shifts, technological advancements, and policy support to meet the changing protein needs of today's world. India has become the most populous nation of the world. It is a country of rich social and cultural diversity, in addition to its geographical, demographic and economic differences. Policymakers and industry leaders must collaborate to ensure food security through responsible protein production.

Keywords: Protein, populations, changing needs, Alternative protein sources

Milk Thistle (*Silybum Marianum*): A Comprehensive Review of Its Therapeutic Potential and Food Applications

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ABSTRACT

Milk Thistle (*Silybum marianum*), commonly known as 'doodhpatra' in Hindi, is a member of the Asteraceae family and has been widely utilized for centuries as a therapeutic herb. The bioactive complex, silymarin, extracted from the seeds of *Silybum marianum*, consists of flavonolignans such as silybin, silydianin, and silychristin. Due to its established antioxidant, lipid-lowering, antihypertensive, antidiabetic, anti-obesity, and hepatoprotective properties, milk thistle holds significant potential for food applications. This study aims to comprehensively analyze the bioactive properties and potential food applications of *Silybum marianum*. While the health benefits of milk thistle are well-documented, research focusing on its molecular structure, metabolism, and innovative applications in food remains limited. By investigating its phytochemical profile and extraction methodologies, this study provides insights into the feasibility of incorporating milk thistle into functional food formulations. A comprehensive literature review was conducted using Google Scholar to gather data on *Silybum marianum*. The bioactive compounds were assessed through spectrophotometry, while fatty acid composition was analyzed using gas chromatography–mass spectrometry (GC-MS). Additionally, solid–liquid extraction and Soxhlet extraction methods were explored for obtaining aqueous and fatty fractions using different solvents. Findings from existing studies highlight the significant therapeutic properties of milk thistle, particularly its hepatoprotective effects and its role in managing metabolic disorders such as diabetes and obesity. The vegetable oil extracted from milk thistle seeds contains high levels of polyunsaturated fatty acids, contributing to its nutritional value and potential incorporation into dietary formulations. Milk thistle exhibits promising applications in functional foods and nutraceuticals due to its potent bioactive compounds. However, further research is needed to elucidate its molecular mechanisms, optimize extraction techniques, and explore innovative delivery systems for enhanced bioavailability. This study underscores the potential of *Silybum marianum* as a functional ingredient in food products. Future research should focus on its chemical characterization, metabolism, and novel food applications to harness its full therapeutic and nutritional potential.

Black Rice: An Emerging Functional Food with High Nutraceutical Value

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ABSTRACT

Black rice is a special type of rice with colored pericarp due to the presence of anthocyanins, a type of flavonoid. It has gained significant attention due to its sensory attributes, high nutritive value, and notable health benefits. Black rice is a rich source of essential amino acids, dietary fiber, B-complex vitamins, vitamin E, and minerals such as iron, zinc, and manganese. Its immense benefits are largely attributed to anthocyanins, which exhibit antioxidant properties that have the potential to act against the free radical concentration which can cause cellular damage, thus imparting plethora of health benefits. It is increasingly being consumed for its nutraceutical value as it is gluten free, cholesterol free and helps in prevention and management of heart disease, cancer, diabetes, high blood pressure, and contributes to improved quality of life. This study is a preliminary report of our results on analysis of the nutritional composition of black rice. Black rice genotypes from different geographical locations were assessed for a comparative account of total anthocyanin, protein and mineral content, and key metabolites. The results indicate significant variation among genotypes, with black rice consistently exhibiting higher levels of these nutritional components compared to white rice. Given its superior nutritional profile, black rice holds great potential in addressing the growing demand for nutrient-rich foods and contributing to global food security.

Keywords: Anthocyanin, Black rice, Functional food, Metabolites, Nutritional profiling

Unveiling the Health Benefits of Underutilized Seeds of Foxnut as a Nutraceuticals

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ABSTRACT

Foxnut (*Euryale ferox salisb.)* is an aquatic crop grown in stagnant water bodies like ponds, lakes etc. It is also renowned as food of God as it is chiefly used as prasad during religious worships and offerings. It belongs to a non-cereal food crop from Nymphaeaceae Family. The prevalence of foxnut worldwide is in South and East Asia, such as India, China, Nepal, Bangladesh, Russia, Korea and Japan. In India—Bihar, West Odisha, Assam, Tripura, Manipur, and Bengal—are allowed to cultivate it. Around eighty percent of the world's worldwide production of processed makhana is produced in the districts of Madhubani, Darbhanga, Purnia, and Katihar alone. Makhana is a water-based agricultural product that is low in fat and high in amino acids and carbohydrates. It consists of antioxidants, bioactive compound kaempferol, a flavonoid which act as anti-inflammatory agent and free radical scavenging effects. Foxnut also act as an anti-ageing and anti-diabetic agent. It is powerpack of minerals like iron, phosphorus and calcium. It is the best source of protein for the vegetarian individual to complete their nutritional requirement. The flavonoid titled kaempferol, which is also found in almond skin, can be found in fox nuts and adds to their phytochemical action. When it comes to carbohydrates, proteins, phenol, and ascorbic acid, foxnuts have a better nutritional profile than other dry fruits like walnut, almond, cashew nut, or coconut. Euryale ferox is believed to have a variety of medicinal qualities, including hypoglycaemic, anti-melanogenic, antihyperlipidemic, hepatoprotective, immunomodulatory, and anticytotoxic characteristics. E. ferox has medicinal benefits for the respiratory, circulatory, digestive, renal, and reproductive systems. Thus, it can also be considered as a good nutraceutical.

Keywords: Foxnut Seeds, Germination, Nutritional Value, Antinutritional Factors, Kaempferol, Antioxidants, Bioactive Compounds, Anti-inflammatory Properties.

A Comprehensive Review on Therapeutic Potential of *Andrographis Paniculata (Kalmegh)* in Management of Diabetes

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ABSTRACT

Andrographis paniculata, a medicinal plant which is known for its antioxidant and anti-inflammatory properties, has gained a lot attention due to its potential therapeutic use in management of diabetes mellitus. As diabetes continues to rise globally, there is a growing interest in exploring natural, plant-based or natural medicinal treatments to supplement conventional therapies. Therefore, with the objective to explore the impact of *Andrographis panicula* on diabetes, a comprehensive literature search was planned. The methodology includes various search databases like PubMed, Scopus, and Google Scholar to identify relevant studies published up to the present. A total of 29 articles were identified and reviewed using the search terms "Andrographis Paniculata AND Diabetes"; "Kalmegh AND Diabetes"; "Andrographis Paniculata AND Anti-diabetic activity". This review highlights the evidence supporting antidiabetic potential of *Andrographis paniculata*. The results revealed that the plant active compound, particularly andrographolide, show significant hypoglycemic effects by improving glucose uptake, enhancing insulin secretion and modulating key enzymes involved in carbohydrate metabolism. Additionally, the antioxidant and anti-inflammatory properties of the plant also aid in the treatment of issues associated with diabetes. Animal studies and clinical trials also show improved lipid profiles, increased insulin sensitivity, and a significant decrease in fasting blood glucose. The study concluded that despite promising results of *Andrographis paniculata* on blood glucose profile, there is a need for long-term robust clinical trails and further research.

Keywords: Andrographis paniculata, diabetes, anti-diabetic activity, andrographolide, insulin sensitivity, glucose metabolism, oxidative stress.

Optimizing Health and Nutrition Status of Migrant Construction Workers and Preparation of Premix

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ABSTRACT

There are several unique challenges faced by migrant construction workers that not only impact their overall health and nutrition, but also include their poor living conditions, limited access to healthy food, all day working, and immense physical demands. All these factors lead to increase in malnutrition rate, and various other health issues, which ultimately affect their productivity as well as quality of life. The purpose of this review is to explore and identify the strategies for optimizing the nutrition and overall health of migrant construction workers, putting the focus on use of formulation and premixes which are nutrient dense specially designed to meet to meet their dietary needs as per their demands. This study helps to highlights the common nutritional deficiencies that are prevalent among this workforce, which include inadequate intake of vitamins, minerals and other macronutrients, and also analyzes how premixes specially the fortified ones can help bridge these gaps. It also helps to examine the challenges which are encountered in implementing effective nutrition programs for migrant workers, such as cultural, economic, and logistic barriers, and proposes practical solutions to improve their access to optimum nutrition. By evaluating current research and proposing evidence-based interventions, this review underscores the importance of a holistic approach to health and nutrition, highlighting the role of tailored premix supplements in enhancing the overall well-being and productivity of migrant construction workers.

Keywords: Construction worker, nutritional status, premix, health, migrants

Optimizing Health and Nutrition Status of Migrant Construction Workers and Preparation of Premix

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ABSTRACT

Construction workers face tough challenges every day, including inadequate nutrition, increased physical demands, limited resources, poor health and hygiene conditions, which can significantly affect their health and well-being. Long hours of hard labour and vigorous physical activity can lead to muscle strain, injuries, and other health issues. Among the various factors contributing to the health of migrant construction workers, adequate nutrition plays an important role in maintaining health, optimal physical performance as well as preventing occupational-related ailments. This review aims to optimise the health and nutritional status of migrant construction workers through educational and nutritional interventions including the preparation of nutritional premixes to prevent deficiencies of essential nutrients, focusing on health-related problems and developing strategies to combat malnutrition. This review emphasizes the importance of nutrients including protein and calcium in the diets of construction workers, focusing on their vital role in muscle repair, bone health, and overall health and well-being. Protein is an essential nutrient for muscle recovery and strength, while calcium is crucial for bone density and the prevention of bone-related injuries. However, many construction workers struggle to meet their daily requirements for these nutrients, either due to the lack of awareness, limited access to healthy food, or the challenges of their work environment. This review paper focuses on the importance of protein and calcium in the diet of migrant construction workers and focuses on the development of a nutritional premix that could help fulfil these requirements. The premix would be rich in protein and calcium and designed to be easily accessible and affordable for workers and it will help in improving the health and nutritional status of the migrant construction workers.

***Keywords*:** Construction workers, health, premix, nutrition status.

Holistic Approach to Telomere Health and Premature Aging

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ABSTRACT

The increasing challenges of a Premature aging global population have brought research into the spotlight. Premature aging is a phenomenon that occurs when an individual deals with signs of aging earlier. Aging has a significant impact on telomere length. With each cycle of chromosome replication, telomeres progressively shorten. Telomerase is one of the enzymes that hold clues to how our bodies age and the reason for developing disease. This study was conducted by systematically analysing existing literature to identify research gaps related to Premature aging. Based on the identified gaps, this study aimed to address specific aspects of premature aging through data synthesis. Lifestyle, dietary habits and sleeping patterns play a crucial role in preserving telomere integrity. Nutrients that aim to promote the length of telomeres are Apigenin, Anthoxanthin, Curcumin, polyphenols, Quercetin. Stress is a significant contributor to aging. Excessive consumption of advanced glycation end products (AGE's) has been linked to the accelerated shortening of telomeres, potentially contributing to cellular aging and related health issues. Encouraging gut bacteria helps in forming short chain fatty acids which aim to eliminate AGE's from the body. Insulin-like growth factor-1 (IGF-1) synthesis by the liver is also known as an anti-aging hormone. To maintain a healthy level of IGF-1 in the body, it is essential to follow a balanced diet and exercise. This study concludes that maintaining a healthy lifestyle, establishing a consistent sleep routine, practicing mindful breathing, and consuming a balanced diet are essential for preserving telomere length.

***Keywords**:* Premature aging, Telomere, Telomerase, Advanced glycation end products (AGE's), insulin like growth factor-1(IGF-1).

Optimizing Pregnancy Outcomes: The Role of Zinc and Vitamin A Supplementation

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ABSTRACT

Zinc and Vitamin A deficiencies are significant public health concerns, affecting pregnant women and children in both developing and developed countries. During pregnancy, the demand for these nutrients increases, and their deficiencies are linked to adverse pregnancy outcomes, including prolonged labor, caesarean delivery, preterm birth, and low birth weight, which may weaken infant immune responses. This study aimed to assess the impact of Zinc and β-Carotene supplementation on pregnancy and infant health outcomes. Out of 500 pregnant women, 100 Zinc- and Vitamin A-deficient subjects were selected and categorized into four groups: Zinc supplementation (Group I), β-Carotene-rich food supplementation (Group II), combined Zinc and β-Carotene supplementation (Group III), and a control group (Group IV) with no supplementation. Zinc was provided as zinc gluconate syrup (7.5 mg elemental Zinc/day), while β-Carotene was administered through Amaranth biscuits (1200 µg/day). The study observed significant improvements in pregnancy outcomes, including term and type of delivery, as well as newborn parameters such as birth weight, head circumference, chest circumference, length, and gestational age. The most beneficial effects were noted in the combined supplementation group. A positive correlation was found between serum Zinc and retinol levels with birth outcomes. The highest risk of adverse pregnancy and neonatal outcomes was observed in the control group. These findings suggest that Zinc and β-Carotene supplementation may help reduce complications in pregnancy and improve newborn health. Further studies with larger sample sizes are needed to confirm these results and optimize micronutrient interventions.

Keywords: Zinc, Vitamin A, Pregnancy Outcomes, Supplementation, Newborn Health

Development And Characterization of Milk Flaxseed-Based Fermented Composite Beverage for Female Health

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ABSTRACT

The current project was undertaken to develop of milk-flaxseed-based fermented composite beverage which could be beneficial for the overall health management of female population. Flaxseed is a rich source of lignans which are biologically active agents and may provide protection against various health disorders in females during estrogen-deficient situations. Furthermore, functional probiotic organism present in the product would be beneficial in digestion, nutrients absorption and overall health management of female and milk could be an useful source of essential nutrients like calcium and protein. Functional probiotic organism *Lactiplantibacillus plantarum* NCDC-21 was used for ferment milk-flaxseed-based composite substrate for suitable fermentation time. The optimized product was prepared by fermentation of composite substrate containing skimmed milk and 3% of roasted flaxseed flour with NCDC-21. The fermented substrate was converted into a beverage by adding suitable water containing spices and stabilizer (pectin). The level of added water, stabilizer, salt and spices was optimized on the sensory basis. The optimized product had an acceptable overall acceptability score. The product had an acceptable probiotic count of 8.84 Log CFU/ml of beverage. The crude fibre content of the product was 1.92% on DM basis. The optimized drink was sensorily acceptable up to a period of 10 days when packed in Glass and PET bottles and stored at 4±1°C. The initial acidity was increased during 10 days of refrigerated storage. The sensory quality of the product kept in the glass bottle was observed superior to in PET bottle during storage.

Keywords: Milk, Flaxseed, *Lactiplantibacillus plantarum,* beverage, lignan

Microbiome and Dietetics: An Emerging Frontier in Combating AMR and Enhancing Human Health

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ABSTRACT

The human microbiome, primarily residing in the gut, plays a crucial role in metabolism, immunity, and neurological function. Functioning as a second genome, it influences health through complex interactions with genetic, dietary, and environmental factors. Beyond digestion, the gut microbiome impacts neurodevelopment via the gut-brain axis and skin health through the gut-skin axis, with maternal microbiota significantly shaping infant neurodevelopment. Diet and food practices serve as key determinants of gut microbiome composition. Short-chain fatty acids (SCFAs) produced by gut microbes regulate metabolic pathways, immune responses, and gut integrity. However, modern food processing and dietary imbalances such as high-fat, low-fiber diets, ultra-processed foods, and artificial additives disrupt microbial diversity, weaken the intestinal barrier, and promote obesity, metabolic disorders and intestinal inflammation, particularly in individuals with conditions like inflammatory bowel disease (IBD) and colorectal cancer (CRC). Excessive antibiotic use further aggravates gut dysbiosis, leading to microbial imbalances, promotion of antibiotic-resistant strains proliferation and increased susceptibility to infections and pathogens like *Clostridioides difficile,* turning the gut into a reservoir of resistance genes. To sustainably address these challenges, innovations in food science now focus on microbiome-targeted strategies, next-generation probiotics, postbiotics, and functional food development. Sustainable agricultural practices, microbiome-friendly dietary choices and precision nutrition approaches offer promising solutions for restoring gut health and mitigating antimicrobial resistance (AMR). Integrating microbiome research with dietetics and AMR mitigation strategies will be essential for improving human health and ensuring sustainable food production.

Keywords: gut microbiome, antimicrobial resistance, dysbiosis, functional foods, precision nutrition

Maternal Knowledge and Practices On Infant & Young Child Feeding In A Delhi Tertiary Hospital: A Cross-Sectional Study

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ABSTRACT

Breast feeding is the ideal feeding for the newborn & infants and exclusive breast feeding is to be practiced for first 6 months of life. Faulty & inadequate feeding is a very important reason for growth faltering & malnutrition up to 2 years of age. To evaluate the Knowledge, attitude and practice with regards to IYCF practices among mothers / primary care givers visiting a tertiary care centre in Delhi. The prospective cross-sectional study was carried in the Department of Paediatrics, Hindu Rao Hospital, Delhi. The study population included 436 respondents visiting the IYCF centre of the hospital. A face-to-face interview was conducted on the first visit using a pretested questionnaire. Anthropometry was done for all patients (n= 439) & those identified as malnourished (n= 109, 25% of the patients enrolled) were given counselling sessions from a specially designed flip book. The pre & post KAP scores were recorded for the respondents of malnourished children. Average age of mothers was 26 years, 50% respondents stayed in joint family with 14 % staying in 3 generation families too. The average KAP scores prior to the counselling sessions were 51.8% (0-6 months) , 52.6% (6-24) months, while post sessions scores were 81.8% & 91.8% respectively. It is found that mother's knowledge level is average about infant and young child feeding components prior to the targeted counselling sessions & improved drastically after the sessions. Antenatal counselling promotes good breast-feeding practices hence existing antenatal counselling on breastfeeding needs to be strengthened by informing all pregnant women about the benefits of breastfeeding and motivating them by curtailing their ill beliefs regarding breastfeeding and educating them that breast Feeding is the healthiest and safest way to feed babies.

***Keywords*:** Breast feeding, complementary feeding, IYCF practices attitude, Knowledge, Practice, Sociodemographic factors.

Study Of the Chemical Composition and Quality Parameters of Edible Vegetable Oils

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ABSTRACT

The chemical properties of edible oils are of paramount importance in deciding their quality, stability, and suitability for consumption. In this research, different samples of oils like cold-pressed mustard oil, sweet almond oil, RBD coconut oil, and almond oil are analysed in terms of important parameters like iodine value, acid value, peroxide value, saponification value, and fatty acid composition. These characteristics are useful in determining oxidative stability, freshness, and possible degradation under different storage conditions.The findings support that cold-pressed mustard oil possesses an iodine value of 0.940 and an acid value of 1.46605, indicating moderate oxidative stability. Sweet almond oil possesses a high acid value (87.91–112.4815), reflecting higher triglyceride hydrolysis. RBD coconut oil demonstrates a high iodine value (5.0396) and a low peroxide value (0.03), indicating high oxidative resistance. Mustard oil samples contained TBHQ and indicated antioxidants for improved stability. The storage stability study tracked peroxide value, free fatty acids, and iodine value on varied storage conditions like ambient temperature, refrigeration, and light. Fatty acid composition by gas chromatography revealed fluctuating amounts of saturated, monounsaturated, and polyunsaturated fatty acids and impacted the risk of oxidation and nutritional status. Observations indicate that higher iodine values reflect higher unsaturation but higher risk of oxidation, while lower peroxide values are associated with improved stability. These observations highlight the need for both chemical and sensorial tests to ensure edible oil quality, to the advantage of the food industry, researchers, and consumers interested in oil safety and shelf life.

Keywords: Edible oils, iodine value, peroxide value, oxidation, oil stability, fatty acid composition.

Unveiling The Health Benefits and Therapeutic Properties of Roselle (Hibiscus Sabdariffa): A Comprehensive Overview

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ABSTRACT

Hibiscus sabdariffa L. (roselle) is a tropical and subtropical plant from the Malvaceae family, widely used in food, beverages, and traditional medicine. Major producers include China, Sudan, India, Malaysia, and Mexico. It contains bioactive compounds such as phenolic acids (protocatechuic acid), organic acids (hydroxycitric and hibiscus acid), anthocyanins, flavonoids, and alkaloids. Pharmacological studies indicate its antioxidant, antibacterial, hepatoprotective, nephroprotective, diuretic, antihypertensive, anti-diabetic, and lipidlowering properties. These effects are linked to its antioxidant activity, enzyme inhibition (αglucosidase, α-amylase, ACE), and calcium channel modulation. Roselle calyces are used in teas, syrups, and jams and as a natural colorant and flavouring agent. Its extracts exhibit antimicrobial effects against Escherichia coli and Bacillus species and may help relieve gastrointestinal and uterine spasms. The physicochemical properties and pharmacokinetic properties of these compounds can guide the development of new drugs and formulations, ultimately enhancing patient outcomes and advancing overall healthcare. In this paper, we aim to review the existing literature on the health benefits of Roselle.

Keywords: Hibiscus sabdariffa; Antioxidants; Anthocyanins; Antimicrobial; Antihypertensive; Anti-diabetic.

Exploring the bioactive properties of propolis: A Comprehensive study overview of its Nutraceutical Potential

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ABSTRACT

Propolis, a resinous substance produced by honeybees, particularly stingless bees (*Meliponini tribe*) and *Apis mellifera*, is derived from various plant sources and has been utilized in traditional medicine for thousands of years across the globe. This natural product is composed of a complex mixture of lipids, beeswax, essential oils, pollen, and over 500 organic compounds, including flavonoids, phenolic acids, polyphenols, terpenes, terpenoids, coumarins, steroids, amino acids, and aromatic acids. Key bioactive compounds such as artepillin C, caffeic acid, caffeic acid phenethyl ester (CAPE), apigenin, chrysin, galangin, kaempferol, luteolin, genistein, naringin, pinocembrin, coumaric acid, and quercetin contribute to its therapeutic properties. Propolis has demonstrated significant potential in managing and treating a wide range of chronic and systemic diseases, including diabetes, cardiovascular diseases, chronic kidney disease, cancers, and oral diseases. Its anti-inflammatory, antioxidant, antimicrobial, and immunomodulatory properties make it a promising candidate for further research and clinical applications. However, there is a pressing need for more comprehensive studies to optimize the use of propolis and its bioactive compounds for improved health outcomes and overall well-being. This paper explores the therapeutic potential of propolis, a natural resin produced by bees.

Keywords- Bioactive compounds; Traditional medicine; Disease management; Anti-microbial; Diabetes; Essential oils.

Protein Supplements: Hype or Health?

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ABSTRACT

Protein is the nutrient which our body needs for building and maintaining body tissues including muscles. The increasing popularity of fitness culture has led to a growing awareness of health and nutrition, resulting in a higher demand for protein supplements among the general population. Protein supplements are considered a sports food, which has been defined as "specialized products to provide a practical source of nutrients when it is impractical to consume everyday foods. However, though used widely, several misconceptions regarding their consumption continue to exist. A large segment of the general population relies on protein supplementation for meal replacement, weight reduction, and purported health benefits. Protein supplements are generally considered low risk when consumed in moderate amounts as part of a well-balanced diet. Most youth athletes meet or exceed protein needs with food alone. Whole-food snack alternatives such as nuts, cheese, yogurt, meat sticks, or boiled eggs provide high-quality protein at a lower cost. They contain key vitamins and minerals and are just as effective for building lean mass. These protein supplements have varying pros and cons associated with them, which are often overlooked by the public.The purported health benefits of protein supplementation have led to overuse by both adults and adolescents. The issue of protein is driven more by marketing hype than physiological reality. Protein supplements are processed products and may lack other essential nutrients necessary for maintaining a healthy lifestyle. It is recommended to obtain the required protein intake from natural food sources, using supplements only when the regular diet does not provide enough protein.

Keywords: Protein supplements, Muscle building, Whole-food alternatives, Marketing hype, Nutritional misconceptions.

The Role of Iron Supplementation in Pregnancy: Balancing Deficiency and Overload

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ABSTRACT

Iron is a crucial micronutrient during pregnancy, necessary for increasing maternal blood volume and supporting optimal fetal growth. The WHO recommends, a daily intake of approximately 30-60 mg of iron to maintain a healthy pregnancy. While the requirement is modest, meeting this through diet alone can be challenging, prompting many women to rely on iron supplements, such as tablets or gummies, to reach their daily target. However, this approach often overlooks the individual's existing iron status. A U-shaped relationship exists for iron levels, with iron deficiency on the left side and iron overload on the right. Iron deficiency is prevalent among pregnant women worldwide and is linked to complications such as preterm birth, small gestational age, maternal mortality, and low birth weight. Conversely, excessive iron intake can also lead to negative outcomes, including neurological disorders in the maternal brain, gestational diabetes, preterm birth, and low birth weight. Therefore, iron supplementation beyond dietary sources must be approached with caution to avoid both deficiency and overload. Pregnant women should only take iron supplements under the guidance of a qualified healthcare provider, and their maternal blood iron levels should be assessed before starting selective or daily iron supplementation.

Keywords: Pregnancy; Iron supplement: Iron overload; Maternal iron levels; Fetal growth.

Exploring the Scope of Dietetic Practice in Managing Multimorbidity in Older Adults

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ABSTRACT

Multimorbidity refers to the co-occurrence of two or more chronic health conditions. This complex health state affects a significant proportion of older adults worldwide. Multimorbidity increases the risk of adverse health outcomes, reduced quality of life, and higher healthcare utilization. Managing multimorbidity requires a comprehensive and coordinated approach to care. Effective management can improve health outcomes, reduce healthcare costs, and enhance patients' quality of life. Multimorbidity is a growing concern among older adults as they have had more time to be exposed to risk factors, such as smoking, poor diet, and lack of exercise. Older adults often take multiple medications, which can increase the risk of adverse interactions and contribute to multimorbidity like diabetes, hypertension which increase the risk of developing other conditions. Moreover, Age-related epigenetic changes can affect gene expression and increase the risk of chronic conditions. Furthermore, other factors may also contribute to the fact that older adults are more prone to multimorbidities like poor dietary choices due to lack of awareness, busy schedule, poor lifestyle and choice. Dietetic practice plays a crucial role in managing multimorbidity, but the scope of this practice is not well understood. This review aims to explore the scope of dietetic practice in managing multimorbidity in older adults, including the assessment, intervention, and monitoring strategies used by dietitians. This also highlights and demonstrates the importance of personalized nutrition interventions, tailored to the individual's specific health needs and goals. Dietitians play a critical role in assessing nutrition status, developing nutrition care plans, and monitoring progress. The evidence suggests that dietetic interventions can improve health outcomes, reduce healthcare utilization, and enhance quality of life for older adults with multimorbidity signifying the prominence of nutriment and medical nutrition therapy in overall which can be an alternative to pharmaceutical approach.

Keywords: multimorbidity, older adults, nutriment, Chronic conditions, personalized care.

Fortified Foods and Its Effectiveness in Reducing Nutrient Deficiencies

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ABSTRACT

Vitamins and Minerals are essential for maintaining good health, and deficiencies can lead to various health problems. Your body gets all the vitamins and minerals it needs from a balanced meal. But not getting enough micronutrients can lead to nutrient deficiencies. Nutrient Deficiencies are still a big public health problem in India, hurting millions of people of all ages and income levels. Fortified foods are especially helpful for preventing nutrient deficiencies because they add important vitamins and minerals to basic foods to make them healthier. This research explores the effectiveness of fortified foods if they could help people who are lacking in micronutrients, especially children, pregnant women, and people from low-income areas. A lot of health problems in the world are caused by micronutrient shortages, like those of iron, vitamin A, iodine, and folic acid. These deficiencies lead to diseases like anaemia, mental impairment, and weak immune systems. The study also looks at recent data from clinical trials and public health programs to find out if fortified foods can help avoid deficiency diseases. Food fortification is a cheap and easy way to help people who aren't getting enough nutrients, if they also get enough variety in their diet and get medical care. In the end, fortified foods are an important part of foreign nutrition policy because they help improve public health.

Keywords: fortified foods, nutrient deficiencies, public health, food fortification, micronutrients.

Therapeutic Diets and Their Impact on Accelerating Patient Recovery

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ABSTRACT

Nutrition plays a fundamental role in healing, with therapeutic diets designed to meet the specific needs of individuals with conditions such as diabetes, cardiovascular disease, renal disorders, and post-surgical rehabilitation. These diets are crafted to support immune function, reduce complications, and promote faster recovery. In addition to nutritional content, factors like taste, texture, portion size, and cultural preferences significantly affect patient adherence, influencing health outcomes. However, therapeutic diets often face challenges related to patient compliance. Meals that lack palatability or do not align with personal preferences can result in reduced intake, nutritional deficiencies, and delayed recovery. Research emphasizes the need to enhance meal quality, ensure sensory appeal, and adapt diets to suit both medical and individual needs. Personalized nutrition strategies, combined with dietitian-led interventions, have been shown to improve patient satisfaction and adherence, leading to better treatment outcomes. The relationship between therapeutic diets and recovery is complex, encompassing clinical nutrition, patient psychology, and healthcare delivery. Understanding these dynamics is crucial to optimizing nutritional care and ensuring that therapeutic diets are both medically effective and acceptable to patients. Investigating the impact of these diets on recovery offers valuable insights into the evolving role of clinical nutrition in patient-centred care.

Keywords: Therapeutic diets; patient recovery; clinical nutrition; dietary adherence; medical nutrition therapy.

Micronutrient Intake and Its Clinical Impact on Hospitalized Chronic Kidney Disease Patients

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ABSTRACT

Chronic kidney disease (CKD) is a progressive condition characterized by declining renal function, leading to metabolic imbalances and increased susceptibility to micronutrient deficiencies. Hospitalized CKD patients are at a heightened risk of nutritional deficiencies due to dietary restrictions, altered metabolism, and ongoing medical treatments. This study aims to assess micronutrient intake, identify prevalent deficiencies, and evaluate the impact of dietary interventions on health outcomes in hospitalized CKD patients. A structured questionnaire was developed to collect dietary intake data, while biochemical profiles were analyzed to determine micronutrient status. A particular emphasis was placed on essential micronutrients like Potassium, phosphorus, iron, and vitamin D, vital for bone strength, anemia prevention, and overall health. The study includes a systematic evaluation of dietary modifications and their effects on clinical parameters such as kidney function markers, inflammation and overall nutritional status. Findings are expected to highlight key deficiencies, inform tailored dietary strategies, and improve patient management. The study will provide evidence-based recommendations for enhancing nutritional interventions and preventing disease complications in CKD patients. By bridging the gap between micronutrient intake and disease progression, this research contributes to optimizing nutritional care, improving patient recovery rates, and advancing clinical dietary guidelines for CKD management.

Keywords: Chronic Kidney disease, Deficiencies, Dietary Interventions, Micronutrients, Nutrition

Protein Supplementation in Preventing and Managing Individuals with Chronic Kidney Disease

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ABSTRACT

Protein metabolism is disturbed by chronic kidney disease (CKD), a progressive illness that raises the risk of cardiovascular disease and causes metabolic problems such as inflammation and protein-energy waste (PEW). Maintaining nutritional health, lowering uremia, and slowing the course of CKD all depend on proper dietary protein control. The impact of dietary changes, such as low-protein diets (LPD) and plant-based protein sources, and protein supplements on the management of CKD are examined in this study. Research indicates that although LPD aids in the management of metabolic issues, it necessitates close observation to avoid muscular atrophy and malnutrition. While consuming too much animal protein, especially red meat, can hasten the evolution of CKD, plant-based proteins assist the kidneys by lowering acid load, phosphorus bioavailability, and uremic toxin generation. Additionally, although more research is required, LPD may improve renal protection when used with renin-angiotensin-aldosterone system (RAAS) inhibitors. Specialised nutritional techniques are needed for the management of paediatric CKD to balance growth and avoid malnutrition. The study emphasises the value of tailored dietary therapies and the need for more research to improve long-term dietary plans and protein consumption guidelines for individuals with chronic kidney disease.

Keywords: Chronic Kidney Disease, Cardiovascular Risk, Plant-Based Protein Diet, Animal-Based Protein Diet, Protein-Energy Wasting, Nutritional Therapy.

Understanding The Mechanism Behind Coronary Artery Disease

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ABSTRACT

Coronary Artery Disease (CAD) is one of the most common heart problems worldwide. It happens when fatty deposits build up inside the arteries that carry blood to the heart. These deposits—made of cholesterol, fat, calcium, and other substances—slowly make the arteries narrower, reducing the flow of oxygen-rich blood. When this happens, a person may feel chest pain (angina), have trouble breathing, or, in severe cases, suffer a heart attack. Atherosclerosis, the main cause of CAD, starts when the walls of the arteries get damaged. This can happen due to high blood pressure, high cholesterol, smoking, diabetes, obesity, or long-term inflammation. The body tries to fix this damage by sending immune cells, but instead of helping, this leads to even more plaque buildup. If a plaque breaks open, it can cause a blood clot that completely blocks blood flow, leading to a heart attack or other serious problems. Certain things increase the risk of CAD, like eating unhealthy food, not exercising, stress, and family history. But the good news is that making healthy choices can help prevent or manage it. Eating more fiber, omega-3s, and antioxidants, staying active, managing stress, and quitting smoking can all keep the heart strong. In some cases, doctors may prescribe medications like statins (to lower cholesterol) or blood thinners. If the condition is severe, medical procedures like angioplasty or bypass surgery may be needed. The key to fighting CAD is early action and prevention. By making heart-healthy choices, people can lower their risk and live a longer, healthier life.

Keywords: Coronary Artery Disease, Atherosclerosis, Heart Attack, Cholesterol, Lifestyle Changes, Prevention, Heart Health

Personalized Nutrition Using AI and Gut Microbiome Analysis

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ABSTRACT

The field of personalized nutrition has gained momentum with advancements in artificial intelligence (AI) and gut microbiome analysis. This study explores the integration of AI-driven algorithms with microbiome profiling to develop customized dietary interventions that optimize health outcomes. The primary objective is to analyze individual microbial compositions and predict nutrient metabolism patterns to recommend precise dietary modifications. The methodology involves machine learning models trained on large datasets of gut microbiome profiles and dietary intake patterns. Results indicate that AI-based approaches enhance accuracy in predicting dietary responses, leading to improved metabolic health and disease prevention. The study underscores the potential of AI in revolutionizing personalized nutrition by providing tailored diet plans that cater to individual microbiota compositions, thereby improving overall well-being and reducing the risk of chronic diseases. These findings emphasize the need for further research into AI-integrated dietary recommendations to refine precision nutrition strategies.

Keywords: AI, gut microbiome, machine learning, personalized nutrition, precision health

Clinical Recommendations for Coffee Consumption in Heart Disease Patients

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ABSTRACT

This abstract explores the relationship between coffee consumption and cardiovascular health, particularly in the context of a sedentary lifestyle. Coffee is one of the most widely consumed beverages globally, known for its effects on relaxation, focus, and fatigue reduction. The key bioactive compound in coffee, caffeine, is a natural stimulant found in coffee beans, tea leaves, and other sources, and plays a significant role in influencing cardiovascular function. The effects of caffeine vary depending on factors such as serving size, preparation method, and coffee type. Moderate coffee intake, typically 2 to 4 cups per day, has been associated with potential cardioprotective benefits, due to its antioxidant and anti-inflammatory properties. However, excessive caffeine consumption can have detrimental effects on cardiovascular health, contributing to hypertension, arrhythmias, and an increased heart rate, especially in individuals with pre-existing heart conditions. Caffeine's biochemical effects are mediated by the CYP1A2 enzyme in the liver, and these effects can vary based on factors such as genetics, age, pregnancy, smoking habits, and medication use. Additionally, a sedentary lifestyle is a significant contributor to cardiovascular diseases. High caffeine intake, when coupled with a lack of physical activity, can exacerbate risks like obesity, insulin resistance, and blood pressure fluctuations, further increasing the risk of cardiovascular diseases. Adopting heart-healthy, well-balanced diets—such as the Mediterranean, DASH, or plant-based diets—can help mitigate these risks. This exploration highlights the importance of moderate caffeine consumption and the need for a balanced lifestyle, emphasizing the role of bioactive molecules in coffee, a healthy diet, and physical activity in promoting overall cardiovascular health.

Key Words: Coffee, Cardiovascular, Sedentary lifestyle, Bioactive, Caffeine.

Exploring The Link Between Diet And Alzheimer's Disease

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ABSTRACT

Alzheimer Disease is a progressive neurodegenerative disorder that is characterized by memory loss, cognitive decline and behavioral changes. The exact etiology of Alzheimer Disease remains unclear but accumulating evidence suggest that diet may play a significant role in its onset and progression. This study examined the current research on the relationship between dietary patterns and the risk of developing Alzheimer Disease. It underscores the impact of different nutrients such as Antioxidants, Omega-3 Fatty Acids and Micronutrients as well as overall dietary patterns like the Mediterranean and DASH (Dietary Approaches to Stop Hypertension) diet. Dietary patterns have been associated with reduced inflammation, oxidative stress and improved cognitive function, all of which may contribute to a decreased risk of Alzheimers. Further also explored the emerging research on the gut brain axis and its potential influence on neurodegeneration highlights the importance of gut health and microbes in the development of Alzheimer Disease. It emphasized the role of Antioxidant, Omega-3 Fatty Acids rich diet in the onset and progression of Alzheimer Disease.

Keywords: Alzheimer Disease, Omega-3 Fatty Acids, Memory Loss, Antioxidants

Effect of Probiotics on Type 2 Diabetes Mellitus Patients

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ABSTRACT

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and hyperglycaemia. Emerging evidence suggests that gut microbiota play a crucial role in glucose metabolism and insulin sensitivity. Probiotics, live microorganisms that confer health benefits when consumed in adequate amounts, have gained attention as a potential adjunct therapy for T2DM management. This review explores the effects of probiotic supplementation on glycemic control, insulin resistance, and inflammatory markers in T2DM patients. Studies indicate that probiotics can improve fasting blood glucose, glycated haemoglobin (HbA1c), and insulin sensitivity by modulating gut microbiota composition, enhancing short-chain fatty acid production, and reducing systemic inflammation. Additionally, probiotics may positively influence lipid profiles and oxidative stress, further contributing to metabolic health. However, variations in probiotic strains, dosages, and study designs present challenges in establishing standardized recommendations. Further large-scale clinical trials are needed to determine the optimal probiotic formulations and their long-term efficacy in T2DM management.

Keywords: Probiotics, Type 2 Diabetes Mellitus, Gut Microbiota, Insulin Sensitivity, Glycemic Control, Inflammation

Harnessing the Anti-Inflammatory Power of Traditional Indian Diet

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ABSTRACT

Chronic inflammation has been identified as a silent but potent cause of many non-communicable diseases (NCDs), such as obesity, autoimmune disorders, cardiovascular disease, type 2 diabetes, and even certain types of cancer. The prevalence of these illnesses keeps increasing as diets around the world move toward highly processed, high-sugar, high-fat Western dietary patterns. Traditional diets, on the other hand, have a built-in anti-inflammatory character since they are based on whole, minimally processed foods that have therapeutic and functional components. Among these, the Traditional Indian Diet provides a special combination of probiotic-rich fermented foods, medicinal herbs and spices, nutrient-dense staples, and a long-standing belief in striking a balance between flavor, health, and medicinal benefits.Regular use of spices like fenugreek, ginger, black pepper, and turmeric releases bioactive chemicals that have been shown to modify gut microbiota and reduce inflammatory indicators, therefore boosting immunological resilience. Furthermore, the natural focus on seasonal vegetables, pulses, and grains high in fiber promotes metabolic health, lowers oxidative stress, and enhances gut-brain communication. This abstract emphasizes how the anti-inflammatory properties of the Traditional Indian Diet are consistent with contemporary nutritional research, offering a dietary approach that is both culturally appropriate and internationally flexible for the prevention and treatment of illnesses caused by inflammation. Reexamining traditional dietary knowledge through scientific validation provides a route toward evidence-based, culturally responsive nutrition interventions that bridge heritage and health, as chronic inflammation remains a significant global health burden.

Keywords: Chronic Inflammation, Gut microbiota, Fermented Foods, Anti-inflammatory, Non-communicable Diseases (NCDs)

Addressing Mental Health Stigma in Urban India: Challenges and Strategies

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ABSTRACT

Mental health remains an underdeveloped area of healthcare in urban India, yet its far-reaching influence on overall well-being cannot be ignored. Rapid urbanization, lifestyle changes, and societal pressures have led to a surge in mental health concerns, including anxiety, depression, and burnout. However, despite increased awareness, a deep-rooted social stigma discourages individuals from seeking timely intervention, often leading to the worsening of psychological disorders. Several key factors contribute to the gap in mental healthcare accessibility. Social misconceptions and cultural biases label mental illness as a personal weakness rather than a medical condition, preventing open discussions and support-seeking behaviour. Additionally, a lack of awareness regarding mental health symptoms and treatment options further exacerbates the problem. Financial limitations also pose a challenge, as therapy and psychiatric care remain expensive and are not widely covered by health insurance. Moreover, the shortage of trained mental health professionals and inadequate infrastructure in urban healthcare facilities limits the availability of quality mental health services. Urban residents, despite having better access to information, are particularly vulnerable to stress due to work-related pressures, academic competition, and social isolation. Studies suggest that stigma reduction interventions, policy reform, and community-driven mental health initiatives are essential to addressing these concerns. Integrating mental health education into school curricula, establishing corporate wellness programs, and ensuring easy access to counselling services can significantly improve mental well-being. Furthermore, technology-based solutions such as teletherapy, mobile mental health apps, and AI-driven psychological support present an opportunity to bridge the accessibility gap. This abstract argues that combating mental health stigma in urban India requires a multidisciplinary approach, including public education campaigns, accessible mental healthcare facilities, and institutional reforms. Creating a society where mental health is treated with the same urgency and priority as physical health is imperative for long-term social and economic progress.

Keywords: Mental Health, Stigma, Awareness, Urban India, Accessibility, Well-being

Role of Mult-Micronutrient Supplementation in Foetal And Prenatal Development

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ABSTRACT

Micronutrients play a crucial role in foetal and prenatal development, influencing maternal health, birth outcomes, and long-term child well-being. Multimicronutrient supplementation (MMS) has emerged as a potential strategy to address maternal deficiencies and improve pregnancy outcomes, particularly in low- and middle-income countries where malnutrition is prevalent. MMS typically includes essential vitamins and minerals such as iron, folic acid, zinc, iodine, and vitamin D, among others. Research indicates that MMS can reduce the risk of low birth weight, preterm birth, and stillbirths compared to iron and folic acid supplementation alone. Additionally, adequate micronutrient intake during pregnancy supports proper placental function, immune system development, and cognitive growth in the foetus. However, despite these benefits, there is ongoing debate regarding the superiority of MMS over single or dual-nutrient supplementation in various populations. Some studies highlight the potential risks of excessive supplementation, emphasizing the need for personalized nutritional approaches. The efficacy of MMS also depends on factors such as maternal diet, socioeconomic status, and healthcare access. While the World Health Organization (WHO) recommends iron and folic acid supplementation as a standard prenatal intervention, MMS is increasingly being considered in regions with high maternal undernutrition rates. Further research is required to optimize MMS formulations, ensure bioavailability, and assess long-term health impacts on offspring. In conclusion, Multi micronutrient supplementation holds promise in enhancing fetal and prenatal development by addressing maternal nutritional deficiencies. However, its implementation should be tailored to population-specific needs, ensuring a balanced and evidence-based approach to maternal and child health.

Keywords: Micronutrient supplementation, fetal development, prenatal nutrition, maternal health, iron and folic acid, pregnancy supplementation, micronutrient deficiencies, public health nutrition

The Role of Nutraceuticals in the Prevention and Management of Type 2 Diabetes

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ABSTRACT

Type 2 diabetes mellitus (T2DM) is a persistent metabolic condition marked by insulin resistance, elevated blood glucose levels, and oxidative stress. Although traditional treatment methods, including medication and lifestyle changes, remain the cornerstone of management, there is a growing interest in nutraceuticals—bioactive substances sourced from food—as potential supplementary options for diabetes prevention and control. This review examines the impact of various nutraceuticals, such as polyphenols, flavonoids, dietary fibers, omega-3 fatty acids, probiotics, and plant-derived bioactives, on enhancing glycemic regulation, improving insulin sensitivity, and influencing gut microbiota. The mechanisms underlying their anti-diabetic properties, including the inhibition of carbohydrate-digesting enzymes, the reduction of inflammatory markers, and the safeguarding of pancreatic β-cell function, are analyzed. Furthermore, the review addresses clinical evidence that supports their effectiveness, safety issues, and the challenges associated with standardization and regulation. While nutraceuticals show potential in augmenting traditional diabetes management strategies, additional research is essential to establish optimal dosages, bioavailability, and long-term impacts.

Keywords: Type 2 diabetes mellitus, nutraceuticals, insulin resistance, polyphenols, flavonoids, probiotics, glycemic control, oxidative stress, β-cell function, gut microbiota.

Exploring Millet Fortification and the Role of Phytosterols in Cardiovascular Disease Prevention

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ABSTRACT

Cardiovascular diseases (CVD) remain a leading cause of mortality worldwide, with hypercholesterolemia identified as a major risk factor. Millet, a nutrient-dense grain, has gained attention due to its potential in reducing CVD risk when fortified with bioactive compounds such as phytosterols. Phytosterols, plant-derived sterols structurally similar to cholesterol, are known to reduce low-density lipoprotein (LDL) cholesterol by inhibiting intestinal cholesterol absorption. Recent studies have demonstrated that dietary supplementation with phytosterols (2 g/day) can lead to a 10-15% reduction in LDL cholesterol, aligning with global dietary recommendations for hypercholesterolemia management. The inclusion of fortified millet in the diet can enhance phytosterol intake, contributing to a dual mechanism of action: fibre-mediated lipid metabolism regulation and sterol-induced cholesterol reduction. This synergistic effect suggests that millet fortification with phytosterols could serve as a functional food strategy for cardiovascular risk mitigation. However, long-term clinical trials are necessary to establish its efficacy in reducing CVD incidence. Millets play a significant role in controlling blood pressure, blood sugar levels, and thyroid function. Moreover, to combat malnutrition in children and adolescents, millet consumption can enhance immunity and overall health. Despite these health benefits, millet consumption has been on the decline. In this paper, the authors explored the potential of millets as a valuable Nutri-cereal, highlighting their diverse health benefits. We also highlighted the potential of millets in reducing CVD risk when fortified with bioactive compounds such as phytosterols.

Keywords: Cardiovascular disease; Phytosterols; Hypercholesterolemia; Low-density lipoprotein (LDL); Millet Fortification.

Nutrigenomics And Precision Diets for Chronic Disease Management

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ABSTRACT

Nutrigenomics, a rapidly evolving field, investigates the relationship between genetic variations and nutrient metabolism, providing a foundation for precision diets tailored to individual genetic profiles. This approach holds significant potential in chronic disease management by offering personalized nutritional interventions based on an individual's genetic predisposition. Chronic conditions such as diabetes, cardiovascular diseases, and obesity are influenced by genetic factors, making conventional dietary guidelines less effective for diverse populations. This study explores the role of nutrigenomics in developing precision nutrition strategies to enhance disease prevention and treatment outcomes. The research employs genomic profiling, dietary assessments, and data-driven models to identify genetic markers associated with nutrient metabolism and chronic disease susceptibility. Findings suggest that gene-targeted dietary modifications improve metabolic responses, reduce disease progression, and optimize therapeutic efficacy. This study highlights the transformative potential of nutrigenomics in shifting from generalized dietary recommendations to personalized nutrition, paving the way for improved public health strategies. Future advancements in genetic screening and AI-driven nutrition models will further refine precision diets, making them more accessible and effective.

Keywords: chronic disease, nutrigenomics, precision diet, personalized nutrition, gene-diet interaction

A Study on Knowledge, Attitude and Practice Towards Breastfeeding Among Lactating Mothers on Infant Growth and Development: Impact of Socio Demographic Determinants

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ABSTRACT

Breastfeeding is crucial for infants' nutrition and development influencing both short and long term health outcomes. Breast Milk consists of colostrum, it is essential for a newborn's health and development. Colostrum is thick yellowish milk produced in the first few days after birth. It consists of a high concentration of nutrients and antibodies. It also boosts immunity, aids digestion, promotes gut health and acts as a natural laxative.The Knowledge, Attitude and Practice (KAP) of breastfeeding mothers play a vital role in determining methods which impact an infant's health and physical growth . Adequate knowledge equips mothers with essential information on breastfeeding techniques, the benefits of exclusive breastfeeding and how to overcome challenges such as low milk supply or latching difficulties. Proper breastfeeding practices, including correct positioning, feeding on demand, and maintaining skin-to-skin contact, ensure that infants receive adequate nutrition and protection against infections. The study explored the knowledge gaps, cultural influences, and barriers that may hinder breastfeeding success, enabling healthcare providers to design targeted education and support programs. Furthermore, the socio-demographic determinants of parents of a newborn baby is crucial as it influences child's health outcomes, and development. Factors such as age, education level, income, employment status, and marital status affect access to healthcare and nutrition. Antenatal care (ANC) plays a crucial role in ensuring the health and wellbeing of both mother and baby as it monitors the maternal and fetal health, identify and vaccinations. Besides this it also offers health education and counselling.

Keywords: Breastfeeding, lactating mothers KAP Antenatal care, growth and development.

Development Of Gluten-Free Biscuits Using Makhana Flour, Inulin, And Natural Sweeteners: A Functional Food Innovation

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ABSTRACT

This study aimed to develop gluten-free biscuits using makhana (fox nut) flour, inulin, and freeze-dried plum powder to create a functional bakery product. The formulation was optimized to enhance texture, binding, and nutritional properties while maintaining an acceptable sensory profile. The final blend consisted of makhana flour (36.85%), freeze-dried plum powder (5.26%), inulin gel (15.79%), butter (18.42%), khaand (7.89%), powdered sugar (7.89%), baking powder (1.32%), sodium bicarbonate (0.66%), vanilla extract (0.66%), and tapioca starch (5.26%). Key process variables such as hydration, leavening, and fat incorporation were studied to achieve the desired texture and structural integrity. Inulin and milk improved hydration and dough consistency, while butter contributed to smoothness and enhanced mouthfeel. Sensory evaluation confirmed the optimal balance of sweetness and tanginess, primarily influenced by the interaction of inulin and freeze-dried plum powder. Further analysis included nutritional and functional characterization of the product. Laboratory tests assessed fat content, moisture content, ash content, and reducing sugar levels in key ingredients. The final product exhibited a crisp texture, enhanced mouthfeel, and a balanced flavor profile, demonstrating the potential of makhana-based bakery products in the growing functional food market. This study provides insights into gluten-free product development, addressing formulation challenges while contributing to the expanding field of nutrient-dense, functional baked goods.

Keywords: Functional bakery, gluten-free, inulin, makhana, natural sweeteners.

Study Of Bioactive Properties of Black Carrot Powder Prepared by Freeze Drying And Tray Drying Techniques And Its Utilization In Value Added Products

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ABSTRACT

Carrots are available in a spectrum of colours according to specific pigments. As compared to the usual varieties of red and orange carrots, black carrots have higher anthocyanin and flavonoid content which directly contribute to its antioxidant, anti-inflammatory, anti-tumor, antimicrobial, anti-allergic and cardioprotective effects. Due to these characteristics and natural colouring effects, black carrots can be used as an functional ingredient in many value added food products. Major challenge faced by black carrots that restrict their use in fresh form being their seasonal availability and perishability. To resolve this, dehydration and powder formation techniques have been emerged as few effective methods to retain the nutritional content while maintaining their shelf life along with bioactive compounds preservation. In this research, two drying methods, namely freeze drying and tray drying, have been used to prepare a dehydrated black carrot powder and studied for its physiochemical and phenolic constituents. Black carrots were dried in a freeze dryer (at 60°C for 48 hrs) and in a recirculatory tray dryer (at 40°C for 48 hrs) and grinded into a fine powder. Proximate analysis (in %) for FD and TD were found as, moisture content (5.1, 5), ash content (4.8, 6), and crude fiber content (21.8, 20.94), respectively. Bioactive compounds and antioxidant activity for FD were observed as, TFC (12.66 mg rutin eq), TPC (27.15 mg GAE/g), Dpph (0.858 µmol TE/g), Tannins (161.11 mg/g). The strong nutritive profile of black carrot powder can be used in the preparation of various types of functional and value-added foods.

Keywords: cardioprotective, dehydration, functional, physiochemical, phenolics

Gut Microbiome Mechanism and Its Progression In CKD: Potential Therapeutic Strategies

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ABSTRACT

Chronic kidney disease (CKD) is a condition often marked by severe metabolic disturbances, complications of the cardiovascular system and a risk of death that increases over time. In CKD, the composition of the microbiome becomes altered to a higher ratio of proteolytic and urease positive bacteria, such as: Eubacterium, Proteobacteria, Firmicutes, while butyrate-producing bacteria, Bifidobacterium and Lactobacillus, are markedly less. Such shifts cause a metabolic imbalance that favors the overproduction of uremic toxins such as indoxyl sulfate, p-cresyl sulfate, and trimethylamine-N-oxide (TMAO), which accelerate the building of the endothelial dysfunction, oxidative stress and cardiovascular disease that ultimately enhances the progression of CKD. Moreover, gut dysbiosis in individuals with chronic kidney disease (CKD) weakens the intestinal barrier because of a decrease in short-chain fatty acid (SCFA)-producing bacteria. SCFAs, especially butyrate, are essential for maintaining the health of epithelial cells, controlling immune responses, and preventing the movement of harmful microbes across the gut barrier. When SCFA levels decrease, the intestines become more permeable, allowing harmful substances like lipopolysaccharides (LPS) to enter the bloodstream. This leads to increased inflammation and kidney damage. Dysbiosis-induced immune dysregulation also promotes the release of pro-inflammatory cytokines, including tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6), leading to the chronic low-grade inflammation commonly observed in CKD patients. Prebiotics, such as inulin and fructooligosaccharides, selectively stimulate the growth of beneficial bacteria and enhance the production of short-chain fatty acids (SCFAs), thereby improving gut barrier function and reducing levels of uremic toxins. Probiotic supplementation with strains such as Lactobacillus acidophilus and Bifidobacterium longum has been reported to decrease serum levels of indoxyl sulfate and p-cresyl sulfate while modulating inflammation and oxidative stress. Synbiotics, which consist of prebiotics and probiotics, provide a more efficient approach by simultaneously supporting beneficial microbial populations and suppressing pathogenic bacteria, resulting in enhanced metabolic and immune balance in patients with CKD. Dietary intervention by particularly by following a mediterranean diet has been found to have substantial positive effects on gut microbiota and can help slow down the progression of chronic kidney disease (CKD). Rich in fibre, polyphenols, and unsaturated fats, this diet promotes microbial diversity and enhances the production of short-chain fatty acids (SCFAs) while reducing the generation of trimethylamine n-oxide (TMOA). This review aims to comprehensively analyse the mechanistic interplay between alterations in gut microbiota and the progression of CKD, while also exploring the potential of microbiome-targeted therapeutic strategies. Future research should focus on personalized strategies for microbiota modulation, investigating their long-term effects and potential integration into CKD management guidelines.

Keywords: *CKD, Gut-Dysbiosis, Gut Microbiome, Nutritional Intervention, Dietary Intervention*

An Assessment of a Basil-Based Drink Enhanced with A Fruit Mixture for Improved Flavor And Nutritional Value

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ABSTRACT

The growing demand for functional beverages has sparked interest in creating healthy and refreshing drinks that provide both nutritional value and unique sensory experiences. This study focuses on the development and evaluation of a **Basil (*Ocimum basilicum*) drink** with the value addition of a **fruit mixture** to enhance its flavor, nutritional profile, and functional properties. Basil, known for its medicinal properties, including anti-inflammatory, antioxidant, and digestive benefits, was chosen as the base ingredient. The Basil Drink with Passion Fruit, Aamrut, Peach, Cranberry, Mixed Fruit, Mango, and Lychee Flavours is an innovative beverage that blends the therapeutic properties of basil with the exotic and refreshing tastes of seven distinct fruits. Known for its numerous health benefits, basil serves as the foundation of this drink, offering anti-inflammatory, antioxidant, and digestive properties. The addition of passion fruit, aamrut (Indian mango), peach, cranberry, mixed fruit, mango, and lychee infuses the drink with vibrant, tropical flavours, making it both a delicious and nutritious option. Each fruit is carefully selected for its distinct taste and health benefits. Passion fruit provides a tangy, tropical zing, while aamrut offers a rich, aromatic sweetness. Peach adds a soft, fruity touch, complemented by the tartness of cranberry. Mixed fruit introduces a medley of flavours, and mango and lychee offer a smooth, tropical sweetness. Together, these fruits create a harmonious balance that perfectly complements the basil's herbal notes. This basil drink is more than just a flavourful refreshment—it is a powerhouse of vitamins, antioxidants, and hydrating properties. Ideal for those looking to improve digestion, boost immunity, and enjoy a healthy, natural alternative to sugary sodas, it is perfect for all occasions. Whether served as a cooling drink on a hot day or a revitalizing beverage after a workout, this basil-based fruit drink provides a unique, healthful twist on traditional fruit juices, offering both refreshment and wellness benefits in every sip.

Keywords: flavourful, health, refreshing, health benefits

Makhana: A Nutrient Dense Super Food For Optimal Health

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ABSTRACT

Makhana is one of the healthiest snacking and munching option to safeguard health in the era of unhealthy eating and munching. Fox Nuts, or Makhana, have become a hit worldwide because they pack a punch when it comes to antioxidants and minerals. This old-school Indian snack has been a go-to in Ayurvedic medicine for ages, and now people everywhere are catching on to its health perks. Makhana gives good dose of protein, fibre, and key minerals like potassium, magnesium, and phosphorus. The antioxidants in it helps in shielding from oxidative stress, inflammation, and long-term health issues such as cancer, diabetes, and heart disease. Makhana is light on calories but heavy on fibre, so it's great for keeping the weight in check and gut happy. it can used in sweet or Savory dishes which make it a handy and healthy snack to munch on when you're out and about. Makhana offers a tasty way to boost overall health and well-being.

Keywords: Makhana, antioxidants, minerals, gut health, Low calorie high fibre, snacking option, superfood.

Innovations In Carbonated Beverages: Functional and Health-Oriented Drinks

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ABSTRACT

The carbonated beverage industry is shifting towards healthier and functional alternatives. This study explores innovations such as probiotic sodas, electrolyte-infused sparkling waters, and vitamin-enhanced soft drinks. It highlights advancements in natural carbonation, bioactive ingredients, and sugar reduction strategies while maintaining sensory appeal. As consumer demand for clean-label, health-focused beverages grows, these innovations are shaping the future of carbonated drinks, balancing refreshment with nutritional benefits.

Keywords: Carbonated Beverages, Functional Drinks, Probiotic Sodas, Electrolyte-Infused Sparkling Water, Vitamin-Enhanced Soft Drinks, Natural Carbonation, Bioactive Ingredients, Sugar Reduction, Clean-Label Formulations, Health-Conscious Consumers

Advances In Phytoestrogen Extraction: Techniques, Applications, And Therapeutic Potential

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ABSTRACT

Phytoestrogens ($C_{30}H_{18}O_9$) are naturally occurring plant-derived compounds that exhibit estrogenic activity due to their structural similarity to human estradiol (17β-estradiol). Most phytoestrogens belong to the flavonoid family, a diverse group of substituted phenolic compounds. These bioactive compounds are abundant in various plant-based foods, including soybeans, flaxseeds, cabbage, wheat, oats, barley, and other whole grains, fruits, and vegetables. Phytoestrogens are primarily classified into three groups: (1) isoflavones, (2) coumestans, and (3) lignans. They have been widely studied for their potential health benefits, including their role in managing menopausal symptoms, cardiovascular diseases, osteoporosis, neurodegenerative disorders, diabetes, and hormone-related cancers such as breast and prostate cancer. Additionally, phytoestrogens exhibit anticancer properties by reducing the risk of carcinogenesis. Their exposure can be assessed directly or indirectly through plasma or urine biomarkers. The extraction of phytoestrogens depends on the food matrix, with ethanol and methanol being the most used solvents. Significant advancements in extraction technologies have led to the development of modern techniques, including microwave-assisted extraction (MAE), supercritical fluid extraction (SFE), ultrasound-assisted extraction (UAE), accelerated solvent extraction (ASE), and enzyme-assisted extraction (EAE). These innovations aim to enhance extraction efficiency, increase yield, and reduce costs. This review explores the classification, therapeutic applications, and physiological effects of phytoestrogens while providing an in-depth analysis of various extraction methods. Furthermore, it discusses the advantages and limitations of each technique, offering insights into the selection of the most appropriate extraction method based on specific requirements.

Keywords: Phytoestrogen, Estrogen, Extraction techniques, Therapeutic applications, Isoflavones, Coumestans, Lignans

Postbiotics: Novel Bioactive Metabolites in Gut Microbiome Modulation and Health Promotion

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ABSTRACT

Postbiotics are bioactive substances produced when probiotics (beneficial bacteria) break down food during fermentation. Unlike probiotics, postbiotics are not live bacteria but include helpful compounds like short-chain fatty acids (SCFAs), enzymes, peptides, and vitamins. SCFAs such as butyrate and acetate support gut health by strengthening the intestinal lining and reducing inflammation. Peptides and enzymes help improve digestion and fight harmful bacteria, while vitamins like B vitamins and folate promote overall health. Postbiotics play a key role in boosting the immune system, protecting against infections, and improving nutrient absorption. They also have antioxidant properties, which help reduce damage caused by free radicals in the body. Because postbiotics are stable and do not need live bacteria to work, they are easier to store and use in different foods. Common applications of postbiotics include fermented foods like yogurt, plant-based dairy alternatives, and dietary supplements. Postbiotics offer a promising solution for improving health without the challenges of live probiotics. Their long shelf life and wide-ranging health benefits make them valuable ingredients in functional foods. More research is needed to understand their full effects and potential uses in promoting human health.

Keywords: digestion, functional, health, postbiotics, stability

Seeds of Serenity: How The Seed Cycle Supports PCOS & PCOD Wellness

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) and Polycystic Ovarian Disease (PCOD) are complex hormonal disorders that affect millions of women, often manifesting in irregular cycles, weight imbalances, and fertility struggles. While medical treatments aim to manage symptoms, many women are now turning to holistic remedies to restore balance and promote overall well-being. Among these, the ancient practice of seed cycling has emerged as a powerful ally in the journey toward hormonal harmony. The seed cycle is a nutritional approach that involves consuming specific seeds at different phases of the menstrual cycle to naturally support hormonal fluctuations. By incorporating flax, pumpkin, sesame, and sunflower seeds into daily nutrition, women can help regulate estrogen and progesterone levels, reduce inflammation, and alleviate common PCOS and PCOD symptoms such as acne, mood swings, and unwanted hair growth.Flaxseeds, packed with omega-3 fatty acids and lignans, play a pivotal role in balancing estrogen levels, while pumpkin seeds, rich in zinc, support healthy progesterone production and encourage ovulation. Sesame and sunflower seeds, full of essential vitamins and minerals, aid in detoxifying excess hormones and promoting reproductive health. This cyclical seed intake works synergistically with the body's natural rhythm, offering a gentle, holistic way to enhance fertility, manage symptoms, and nurture emotional well-being. Incorporating the seed cycle into a balanced lifestyle provides a nurturing, natural pathway to hormonal balance. Through the ancient wisdom of seed cycling, women with PCOS and PCOD can take empowered steps toward reclaiming their health, cultivating serenity, and embracing a holistic approach to wellness.

Keywords- Pcod , Pcos, seed cycle, lignans, estrogen, hormones, nurture, fertility.

Nutritional Challenges in Cancer Patients: Impact, Deficiencies, and Management Strategies

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ABSTRACT

Cancer is a complicated disease characterized by unregulated cell growth, which frequently causes major health consequences. It remains one of the leading causes of morbidity and mortality globally. Although significant progress has been achieved in cancer treatment, including surgery, chemotherapy, and radiotherapy, with subsequent increased survival rates, these treatment modalities are typically accompanied by side effects that impair nutritional status. Cancer patients may have several dietary difficulties, including appetite loss, nausea, mucositis, taste changes, and gastrointestinal problems such as diarrhoea and malabsorption**.** These issues cause deficiencies in essential macronutrients and micronutrients required for immunological function, muscle preservation, and overall health. Protein-energy malnutrition is one of the most common dietary issues in cancer patients, occurring in up to 80% of those treated. Protein-energy deficiency causes muscular atrophy, weakness, tiredness, and treatment related complications. Deficits in important micronutrients, such as vitamins B6 and B12, cause anaemia and neuropsychiatric disorders, whereas low levels of vitamins C and D impair immunological function and slow healing. Furthermore, omega-3 fatty acids, which are essential in reducing inflammation and oxidative stress, are typically deficient in cancer patients, contributing to disease progression and treatment adverse effects. For cancer patients to better tolerate treatment, recover, and maintain their quality of life, such nutritional deficiencies must be managed by personalized dietary plans, specially designed nutritionally enriched foods, oral nutrition supplements, and, if severe, enteral or parenteral nutrition. Adequate nutritional management has the potential to significantly improve outcomes and quality of life.

Key Words: Cancer Treatment Side Effects, Nutrition, Protein Energy Malnutrition, Dietary Plan, Micronutrient Deficiency.

Functional And Biochemical Properties of Bekang: A Review

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ABSTARCT

The aim of this study is to review *bekang's* functional properties, bacterial diversity, biochemical changes and bacterial-metabolite profiles. The functional properties determined included enzymatic activities, antioxidant activities, acidifying capacity , production and degradation of PGA degradation of antinutritive factors , biogenic amine production ,degree of hydrophobicity and total phenol content while factors like viable cell counts , pH, free amino acids, proteolytic activity and α- amylase activity were utilized to assesss the biochemical changes in both traditional setting and in incubators. The **microbial population** included various strains of *Bacillus subtilis, Enterococcus faecium Lactobacillus, Staphylococcus, Clostridium, Ignatzchinaria, Corynebacterium strains* among different production locations throughout Mizoram. *B.subtilis* accounted for the production of PGA(2.8mg/ml),produces the highest proteolytic activity(1.3 – 3.2 U/ml).LAB strains were shown to degrade phytic acids and oligosaccharides *E.cecorum and E.faecium* showed the lowest acidification value of pH 4.3.The reviews of the studies have concluded that *bekang* possesses antioxidant and free radical (DPPH and ABTS) scavenging activity, its production using low-cost incubator fermentation proceeds at higher rate under controlled temperature – showing potential for its commercialization and a study suggests after analysis ,the bacterial diversity in these foods to provide important information regarding the flavour and texture of the final products of fermentation .

Keywords: *Bekang, Functional Properties, Biochemical Changes, Microbial Population*

Edible Insects as a Source of Protein: Potential, Sources, Methodologies and Challenges

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ABSTRACT

Insect proteins are a beneficial, environmentally friendly and sustainable substitute for conventional sources of protein, and they are becoming increasingly well-known globally over time. Proteins obtained from insects can tackle the rising need for protein brought by the ever-increasing population and ecological issues related to conventional animal rearing. Insect larvae, mealworms, flies, crickets, and grasshoppers are examples of edible insects that are abundant in vital amino acids, minerals, vitamins, and high-quality proteins. They have lower needs for feed, water, and space than traditional cattle, so they release a smaller ecological footprint, producing less amount of greenhouse gases. When incorporated into animal feed and the diet of humans, insect proteins have shown intriguing dietary and therapeutic advantages. Insect proteins are an ideal alternative for the world's protein crisis due to their excellent digestibility and biological absorption. Organic matter can be fed to insects. Waste minimisation and efficient resource utilization are encouraged via insect farming. Consumer appeal has increased because of recent advancements in food processing technology that have made it simpler to incorporate insect proteins into a range of food products, including protein powders, instant energy bars and meat substitutes. The primary goals of continuing research are to improve the nutritional composition of insect protein-based products, ensure regulatory compliance, and improve large-scale insect farming practices. To make insect proteins a widespread food element and increase popularity among customers, further research and awareness are required. The accessibility of food and the long-term stability of the environment could be drastically altered by insect proteins.

Keywords: *Insect proteins, Sustainability, Edible insects, Nutritional benefits*

Phytochemicals: Exploring Alternative Therapies for Inflammatory Bowel Disease

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ABSTRACT

The gastrointestinal tract is a vital organ responsible for nutrient and mineral absorption through the intestinal barrier. Proper gastrointestinal function is crucial for metabolic processes. Inflammatory bowel disease (IBD) is a chronic inflammation of the intestine, classified as ulcerative colitis (UC) or Crohn's disease (CD). The incidence of IBD continues to rise, especially in developing countries. Current treatments, including amino salicylates, azathioprine, and corticosteroids, offer limited relief. New therapies have emerged, such as monoclonal antibodies targeting specific proinflammatory cytokines and adhesion molecules, but these come with significant side effects, raising safety concerns. Toll-like receptor 4 (TLR4) plays a critical role in IBD pathogenesis, and its inhibition has been identified as a potential therapeutic target. Phytochemicals, including flavonoids, lignans, alkaloids, terpenes, saccharides, and saponins, have shown promise as potential treatments for IBD. These compounds modulate TLR4 activity in animal and cell models of bowel inflammation, with flavonoids being the most studied. They exert their effects by regulating immune responses, transcription factors, and cytokine production. This review summarizes recent studies highlighting the potential of phytochemicals as alternative therapies for IBD.

Keywords: Gastrointestinal tract; Inflammatory bowel disease (IBD); Ulcerative colitis (UC); Crohn's disease (CD); Phytochemicals

Role Of Art In Changing Brain Activity And Lowering Stress: The Neuroscience Of Creativity

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ABSTRACT

Creative pursuits have long been linked to emotional well-being. Recent neuroscience studies have depicted the altering of brain activity and lowering stress levels. According to neuroscientific research employing Functional Magnetic Resonance Imaging (FMRI) and Electroencephalogram (EEG) scans, creating art activates the prefrontal cortex, which manages emotions and solves problems. Painting, drawing, dancing, and singing are examples of artistic pursuits that activate the brain's reward system, raising dopamine levels and elevating emotions of enjoyment. The brain's fear-processing area, the amygdala, has been shown to be less active when people create art, which lowers stress and anxiety levels. By improving communication between the hemispheres of the brain, artistic pursuits foster emotional and cognitive adaptability. Research indicates that the main stress hormone, cortisol, is physiologically lowered when one engages in artistic endeavours. Additionally, the repetitive and in-depth nature of creative expression improves relaxation and mental clarity. This study also examines the therapeutic uses of art, including dance therapy, music therapy, and art therapy, which are becoming more widely acknowledged as successful means of treating mental health issues. We can more effectively use artistic engagement as a non-invasive and easily accessible therapy for stress reduction and general psychological well-being. This study investigates how art affects mental health, highlighting the critical role that creativity plays in influencing mental health and cognitive function using a multidisciplinary approach that combines psychology, neuroscience, and art therapy.

Keywords: Neuroplasticity, Art Therapy, Cortisol Reduction

Omega-3 Fatty Acids: Key Players in Cognitive Function and Brain Health

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ABSTRACT

Omega-3 polyunsaturated fatty acids (PUFAs), particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are crucial for brain health and cognitive function throughout life. DHA, the predominant omega-3 fatty acid in the brain, is essential for maintaining neuronal membrane integrity, supporting neurotransmission, and promoting neuroplasticity. Research has shown that omega-3 intake positively impacts cognitive performance, memory, and mental well-being. Epidemiological studies suggest that low omega-3 consumption is linked to cognitive decline, mood disorders, and an increased risk of neurodegenerative conditions like Alzheimer's disease. Randomized clinical trials also indicate that omega-3 supplementation can enhance cognitive function, particularly in aging individuals, by reducing neuroinflammation and improving cerebral blood flow. However, inconsistencies in clinical trial results regarding optimal dosage, bioavailability, and long-term effects highlight the need for further research. This abstract examines the role of omega-3 fatty acids in cognitive health, their potential therapeutic applications, and the necessity for optimized dietary recommendations to support brain function at various life stages.

Keywords: Omega-3 fatty acids; Eicosapentaenoic acid (EPA); Docosahexaenoic acid (DHA); Brain health; Cognitive function.

Strategies and Challenges in Biofortifying Millets for Improved Nutrient Bioavailability

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ABSTRACT

Micronutrient deficiencies affect billions worldwide, leading to undernutrition and perpetuating poverty, particularly in rural areas of developing countries. While commercial food fortification is a common solution, it is insufficient to fully address malnutrition. Biofortification, however, can enhance the nutritional value of plant-based foods, offering a low-cost, sustainable, and long-term method to provide essential micronutrients to the poor. Millets, crucial crops in the semiarid tropics of Asia and Africa, account for over 90% of global production in developing regions. These crops are favoured for their productivity and resilience under dry, high-temperature conditions. Millets are nutritionally rich, containing high levels of proteins, essential amino acids, minerals, and vitamins, making them known as "nutria-cereals." Value-added and functional foods, such as ready-to-eat meals made from composite flours, can be developed using millets like Kodo and Kutki, increasing demand for these grains and supporting agricultural sustainability and the fight against malnutrition. However, biofortification in millets faces challenges due to antinutrients such as protease inhibitors, tannins, phytates, and oxalates, which can impair nutrient digestibility. Improving bioavailability is crucial for effective nutrient absorption. Techniques like soaking, germination, autoclaving, debranning, and adding exogenous enzymes can help reduce antinutrients and enhance nutrient bioavailability. Additionally, advanced genetic tools, including RNA interference and genome editing (e.g., CRISPR, ZFNs, and TALENs), could help mitigate these antinutrients, further improving the nutritional value of millets. This paper discusses the strategies and challenges in biofortification of millets to increase the nutrients bioavailability.

Keywords: Micronutrient deficiency; Biofortification; Millets; Antinutrients; Bioavailability.

Herbal Supplementation in the Body

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ABSTRACT

Herbal supplementation has been widely used for centuries as a natural means to support overall health and wellness. Derived from plants, herbs contain bioactive compounds that can influence physiological processes, providing therapeutic benefits such as anti-inflammatory, antioxidant, antimicrobial, and immune-boosting effects. Common herbal supplements include turmeric, ginseng, echinacea, garlic, and ashwagandha, each offering unique properties that support bodily functions. Once ingested, herbal supplements undergo digestion, absorption, metabolism, and distribution throughout the body. Their active compounds interact with cellular receptors, enzymes, and biological pathways, influencing processes such as immune response, hormone regulation, and detoxification. However, factors like dosage, bioavailability, and potential interactions with medications can impact their effectiveness. While herbal supplementation is generally considered safe, improper use may lead to adverse effects or interactions with pharmaceutical drugs. Therefore, scientific validation through clinical research is essential to ensure efficacy and safety. With growing interest in natural health solutions, further studies on herbal supplementation can help optimise their use for disease prevention and holistic well-being.

Keywords: herbal supplements, bioactive compounds, metabolism, therapeutic effects, safety, clinical research

Formulation Of Functional Fruit Spread Using a Plant Based Gum: A Healthier Alternative

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ABSTRACT

The functional fruit spread developed from a combination of a Amla (Indian gooseberry), Beetroot, Sauf (fennel seeds), Cordia gum, Sugar, and Pectin . It is a novel, nutritious product that combines the health benefits of these ingredients into a spreadable form. Amla, rich in vitamin C and antioxidants, and Beetroot, known for its detoxifying properties and high iron content, serve as the primary base. The formulation was optimized to ensure proper texture, taste, and shelf stability. The mixture was subjected to controlled heat treatment to activate pectin, ensuring that the spread achieved an ideal consistency without compromising the nutritional integrity of the ingredients. The final product is not only rich in essential vitamins, minerals, and dietary fiber but also offers functional health benefits, such as improving digestion, boosting immunity, and supporting cardiovascular health. Sensory evaluation revealed that the spread has a balanced flavor, with a tangy-sweet profile from the Amla and Beetroot, complemented by a subtle hint of fennel. The spread's texture is smooth and spreadable, making it ideal for use as a topping for bread, crackers, or as a filling for various baked goods. This functional fruit spread, with its combination of natural ingredients, offers a healthier alternative to traditional fruit preserves and jams, while also providing additional functional health benefits.

Keywords: Functional fruit spread, Cordia gum, Amla, Beetroot, Anti-inflammatory.

Understanding Gut Dysbiosis in Obesity and the Effects of Functional Foods on Microbiome Health

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ABSTRACT

Gut dysbiosis, a disruption in the balance between host and gut microbiota, plays a significant role in the development of metabolic diseases such as obesity. Dysbiosis can impair the intestinal barrier and gut-associated lymphoid tissues (GALT), allowing bacterial components like lipopolysaccharides (LPS) to trigger inflammatory pathways and contribute to insulin resistance. It also affects the production of gastrointestinal peptides that regulate satiety, leading to increased food intake and a self-perpetuating cycle of weight gain. Changes in the gut microbiome can alter lipid metabolism, further promoting adiposity. Maintaining a healthy gut microbiota is essential for a balanced relationship with the host, with dietary choices playing a crucial role in shaping this microbiome. Therapies like probiotics, prebiotics, synbiotics, FMT, and dietary interventions such as the Mediterranean and ketogenic diets, along with physical activity, can help restore microbiome balance and support weight loss. Foods like orange peels, rich in fiber and polyphenols, promote beneficial gut microorganisms and the growth of probiotics. Prebiotics such as oligofructose enhance the growth of beneficial bacteria like Bifidobacterium and Lactobacillus, reducing ghrelin secretion in obese individuals. Insoluble dietary fibers (IDFs) like cellulose and resistant starch support gut immunity, improve intestinal integrity, and promote probiotic adhesion, while enhancing the bioavailability of polyphenols. Processing IDFs into functional foods adds economic value and increases the use of fiber-rich by-products, creating synbiotic, functional foods that improve human health. This paper provides an overview of the available data on the understanding of gut dysbiosis in obesity and the effects of functional foods on microbiome health.

Keywords: Functional foods, Gut dysbiosis, Lipopolysaccharides (LPS), Microbiota, Obesity, Symbiotics.

Formulation and Analysis of Horsegram cookies

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ABSTRACT

Amongst legumes horsegram (*Dolichos biflorus*) is highly neglected in India and hence require more emphasis on its value added products as it has nutritional, medicinal and fodder value. Horsegram is drought tolerant and having good nitrogen fixing ability. It has been valued in Ayurveda and Unani system of medication for possessing variety of therapeutic properties. The seeds of *Dolichos biflorus* are used in traditional medicine as astringent, anthelmintic, diuretic, expectorant, tonic and ophthalmic. The seeds are also useful for heamorroids, tumors, bronchitis, splenomegaly and in asthma. The Ayurvedic Pharmocopeia describes horsegram as *Usna, Katu, Krumihara, Kaphavatahara*. Although rich in proteins (22%), due to less acceptable taste and flavor of cooked products, it is consumed only by the farming community and low income groups. Thus, it has remained an underutilized food legume. Thus, horsegram is a good functional food for nutrition, food formulation and utilization. The study deals with preparation of value added products (cookies) with incorporation of (5%, 10%, 15% and 20%) roasted horsegram flour. The sensory evaluation of cookies was carried out using 9-point Hedonic scale. The cookies prepared by incorporation of roasted horsegram flour upto 15% were acceptable without affecting organoleptic quality.

Keywords: Horse gram, Cookies, Sensory evaluation, proximate analysis, RHF.

Food Fortification with Functional Ingredients: Studying the Effects of Fortifying Foods with Vitamins, Minerals, And Probiotics on Health Outcomes.

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ABSTRACT

Food fortification is the process of adding essential vitamins, minerals, or other functional ingredients to food products to improve their nutritional value and address deficiencies in the population. Food fortification has emerged as a key strategy to improve nutritional status and prevent diet-related health conditions. Fortification with vitamins such as vitamin D and B12 help s combat deficiencies that contribute to bone disorders, neurological impairments, and weakened immunity. Similarly, vitamin A fortification prevent vision problems and support the immune system. Minerals like iron and zinc play a crucial role in reducing anaemia and supporting cognitive and immune functions. Iodine fortified in salt prevent goiter and thyroid disorders while calcium added to dairy products, juices, and cereals improve bone strength and heart health. Meanwhile, probiotics such as Lactobacillus and Bifidobacterium species contribute to gut health by enhancing digestion, reducing inflammation, and supporting the immune system. Other functional ingredients include Omega-3 fatty acids and dietary fibre. Omega -3 fatty acids are fortified in infant formula and dairy for brain and heart health while dietary fiber is added to cereal and bread to support digestion and prevent constipation. Research indicate that food fortification has significantly improved public health by addressing nutrient deficiencies in large population. However, challenge remain, including ensuring nutrient bioavailability, maintaining stability during food processing, and preventing excessive intake, which could lead to toxicity or imbalance. Advance in food technology, such as encapsulation and nano-delivery system, have improved nutrient absorption and stability, enhancing fortification effectiveness. By optimizing fortification programs, policymaker and food scientists can contribute to global nutrition security and long-term well-being.

***Keywords*: *Bifidobacterium*, Food fortification, well-being, nutrition security**

Nutritional Importance and Health Benefits of n-3 and n-6 PUFA's: Essential Fatty Acids and Dietary Sources

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ABSTRACT

Omega-3 and Omega-6 fatty acids can be derived from multiple sources and offer numerous health benefits. Therefore, it is essential to incorporate them into the daily diet for optimal health and to prevent various ailments. The Indian Council of Medical Research (ICMR) recommends a daily consumption of 250 mg of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) for adults. In recent years, there has been a substantial growth in public awareness regarding healthy eating patterns. Omega-3 fatty acids have gained particular popularity among various nutritional food categories, increasing the intake of dietary supplements. n-3 and n-6 fatty acids are fundamental to the nutraceutical industry due to their potential therapeutic benefits in treating neurological disorders, malignancies, and numerous reproductive problems, and enhancing individual immunity. Contemporary dietary habits and lifestyle serve as the basis for all lifestyle-related diseases and metabolic disorders. Consequently, there is a reduced availability of DHA, EPA, and arachidonic acid for human metabolism. The early health benefits of n-3 and n-6 PUFAs were observed in Greenland Eskimos, who adhered to a fish-rich diet, which was associated with low incidences of sclerosis, asthma, type 1 diabetes mellitus, and other cardiovascular illnesses. Numerous brands of yoghurt, drinks, and algae oils are fortified with DHA. These supplements comprise re-esterified triglycerides, natural triglycerides, free fatty acids, and phospholipids. Strategic dietary intervention and targeted supplementation with full n-3 PUFAs yield promising therapeutic outcomes for the management of diverse health disorders.

Keywords: DHA, Health, Nutraceuticals, Omega-3, PUFAs

Development of Innovative Gluten-Free Cookies: Enhancing Flavour and Nutrition

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ABSTRACT

Globally, the increase in non-communicable diseases demands need for gluten-free, high-fibre nutraceutical foods. Cookies, commonly high in carbs, fats, and calories but low in fibre and nutrients, are evolving through fortification for improved quality. This study introduces a novel approach to cookies development by incorporating banana flour, arrowroot powder, papaya seeds powder, and activated nuts and seeds. These ingredients, like gluten-free banana flour and nutrient-rich seeds, aim to boost nutritional content and enhance texture, while the activation process improves nutrient absorption. The experimental design encompasses a series of formulations, varying the ratios of banana flour, arrowroot powder, and papaya seeds to optimize sensory attributes, nutritional content, and shelf-life stability. The study employs sensory evaluation and nutritional computing to optimize formulations. Preliminary results of cookies enhanced with activated nuts and oil seed, indicate promising outcomes in terms of texture (8.65 ± 0.4), colour (8.95 ± 0.2), aroma (8.75 ± 0.4), taste (8.75 ± 0.4), and overall acceptability (8.9 ± 0.3). The nutritional analysis of the cookies indicates a considerable presence of dietary fibre, registering at 19.51g per 100g. Moreover, they boast noteworthy levels of essential minerals, specifically calcium (400mg), potassium (378mg) and low in sodium (12mg). This nutritional profile enhances their value and demonstrates potential benefits for individuals with gluten sensitivities, as well as those exploring innovative gluten-free alternatives.

Keywords: Activated nuts, Arrowroot, Banana flour, Cookies, Gluten-free.

From Root to Refreshment: Characterization and Nutritional Quality Assessment of Black Carrot (*Daucus carota* L. sativus) Juice

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ABSTRACT

The juice was extracted from black carrots (*Daucus carota* L. subsp. sativus) that have recently fashioned a lot of interest for their unique phytochemical composition, especially anthocyanins because of their potential as a rich antioxidant and overall beneficial health properties. The purpose of the current study was to analyse black carrot juice, characterize it and assess its nutritional value through various physicochemical, phytochemical, and antioxidant evaluations. The proximate composition (carbohydrates, protein, crude fiber) and physicochemical properties (pH, titratable acidity, total dissolved solids, TSS, total sugar, ascorbic acid) were determined with established standard procedures. Anthocyanin content, total phenolic compounds (TPC), and the concentration of flavonoids were measured using spectrophotometric techniques and antioxidant activity was measured by DPPH. The nutritional profiling showed that juice had the virtuous amount of anthocyanins (264.93 - 313.63 mg/100 mL), Total Phenolics Content (277.81 -357.46 mg GAE/100 mL) and free radical scavenging activity (74%) with less amount of ascorbic acid (5.71 mg/100 mL). in terms of physicochemical we found that black carrot juice has 12.43% CHO, 0.60% protein, 6.53, 2.43% crude fiber with 4.01 pH, 0.28% titratable acidity, 9.513% total dissolved solids, 10^0 Brix TSS, 8.20 total sugar. Due to its nutritional quality it is recommended to in further studies black carrot juice blend with acidic medium fruits and develop refreshing beverage, that is good in taste with rich in nutritional value and antioxidant properties.

Keywords: *Black carrot, Anthocyanin, Antioxidant, Nutrition*

Impact of amla and turmeric powder supplementation on Glycemic control in young adults (20-39 years) with non-insulin-dependent Diabetes

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ABSTRACT

Diabetes is a growing global health concern, with young adults increasingly affected by Type 2 Diabetes Mellitus (T2DM). This study examines the effects of amla (Emblica officinalis) and turmeric (Curcuma longa) powder consumption on fasting and postprandial blood sugar levels in non-insulin-dependent diabetics aged 20-39 years. A total of 18 diabetic subjects were randomly divided into experimental and control groups (9 subjects each). The experimental group consumed 2.5g each of amla and turmeric powder daily for 45 days, while the control group followed their regular diet. Blood glucose levels were measured at 0, 15, 30, and 45 days to track changes. The results demonstrated a significant reduction in fasting and postprandial blood glucose levels in the experimental group compared to the control group. By the 30th and 45th day, the fasting blood glucose levels in the experimental group had dropped significantly ($p < 0.05$), showing improved glycemic control. Similarly, postprandial blood glucose levels were also significantly lower in the experimental group on the 30th and 45th days, confirming the beneficial effects of amla and turmeric. Dietary analysis revealed that the experimental group had a higher intake of protein, phosphorus, and other essential nutrients, which may have contributed to better blood sugar regulation. The study highlights the potential of natural herbal interventions in diabetes management and emphasizes the need for greater awareness of healthy lifestyle choices, regular exercise, and balanced nutrition to prevent and manage diabetes in young adults. These findings suggest that amla and turmeric supplementation could be an effective dietary strategy for improving blood glucose levels in non-insulin-dependent diabetics, supporting their potential role in holistic diabetes management.

Keywords**:** Fasting blood sugar level, post prandial Blood sugar level, non-insulin dependent diabetics, Amla powder, Turmeric powder

Food Cravings: The Science of Food Cravings and Their Impact on Health

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ABSTRACT

Food Cravings are strongly wants for foods, impacted by physiological, mental, and natural variables. Not at all like starvation, which fulfils a natural require, longings emerge from brain chemistry, hormonal changes, stretch, and tangible triggers like locate or scent. Neurotransmitters such as dopamine and hormones like ghrelin and leptin play pivotal parts in strengthening desires, especially for high-calorie foods, which tend to extend all through the day. Social contrasts too impact the sorts of nourishments needed. Whereas longings frequently lead to food consumption, their impacts amplify past slim down, possibly contributing to corpulence and related wellbeing concerns. They can moreover meddle with fundamental wellbeing perspectives like rest and work out and adversely affect social connections, work performance, and standard of living. In extraordinary cases, uncontrollable cravings lead to rash behavior, lawful issues, or mischances. Understanding the components behind food craving is key to overseeing them viably through careful eating, adjusted sustenance, and behavioural methodologies, advancing superior by and large well-being.

Keywords: Food cravings, Dopamine, Ghrelin and Leptin, Nourishments

Decoding the Glycan Code: Implications for Cellular Processes and Biomedical Research

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ABSTRACT

Glycans are very important macromolecules participating in the structural integrity and molecular recognition of biological systems as well as acting as biomarkers. They play a critical role in the organization of membrane, the formation of extracellular matrix and protein folding. Glycans are protective barriers from pathogens, they control immune responses and they affect gene expression by epigenetic modifications. The work presented here explores the biological functions of glycans among which their structural roles, impact on the pathogenic defence mechanisms, cellular adhesion or gene expression regulation are considered. We have demonstrated how glycan modifications affect protein stability, influence host–pathogen interactions and regulate intercellular signalling pathways through a comprehensive literature review and molecular analysis. Thus, glycans could represent important biomarkers and suitable therapeutic targets for a whole range of diseases, including cancer, viral infections and inflammatory disorders. It brings in significant advancements in biochemistry and physiology of glycans and their application in biomedical research, drug avenues, and regenerative medicine. The study of glycan-based interactions will pave way for future development of new approaches in disease prevention and treatment and will enrich our knowledge regarding glycobiology that is vital in the development of health care and biotechnology.

***Keywords*:** biomarker, cell signalling, glycan, membrane, pathogen

Nutraceuticals: Health benefits and Microbial contribution

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ABSTRACT

Nutraceuticals, a class of bioactive compounds derived from food sources, have gained significant attention for their potential health benefits, extending beyond basic nutrition to the prevention and management of various chronic diseases, including cardiovascular diseases, diabetes, and cancer. These compounds, such as vitamins, minerals, polyphenols, and probiotics, are recognized for their therapeutic properties and ability to enhance overall health and well-being. Recent advancements in research have highlighted the vital role of the gut microbiome in modulating the efficacy of nutraceuticals. Microorganisms in the gut play a critical role in metabolizing and transforming these bioactive compounds, influencing their bioavailability and activity. Gut microbiota can alter the chemical structure of certain nutraceuticals, enhancing or limiting their bioactive effects. Additionally, microbial fermentation of specific compounds can lead to the production of beneficial metabolites, further supporting human health. The interaction between nutraceuticals and the microbiome is complex and bidirectional, offering insights into personalized medicine and dietary interventions. As the understanding of this relationship deepens, it may pave the way for more targeted, microbiome-informed strategies in nutrition and disease prevention. This abstract emphasizes the importance of investigating the microbial contributions to the health benefits of nutraceuticals for advancing public health and therapeutic practices.

Keywords: Nutraceuticals, microorganisms, health, nutrition.

THEME 4
CURRENT TRENDS IN FOOD SCIENCE &TECHNOLOGY

Innovative Biodegradable Packaging Films from Cellulose-Chitosan Complexes

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ABSTRACT

Plastic's durability has transformed our lives, but its non-biodegradability causes persistent microplastic and nanoplastics pollution, jeopardizing ecosystems and human health. This challenge has driven the search for sustainable plastic alternatives, and cellulosic residue from agri-processing byproducts such as soyhulls is a feasible option. Soyhulls, comprising 7–8% of soybean mass, constitute a significant byproduct of soybean processing and contain about 50% cellulosic residue. The global soybean production is projected to reach 371 million tons by 2030; soyhulls present a valuable resource for developing biodegradable materials. In this study, soyhull cellulosic residue was extracted using potassium hydroxide and sodium chlorite treatments, then dissolved in $ZnCl_2$ solution and combined with 1, 3, 5, and 7% of four chitosan types: Food, Industrial, Niger, and Mushroom grade. Calcium ions were added as a crosslinking agent, followed by glycerol for plasticization. Films were analyzed for mechanical strength, barrier properties, UV blocking, moisture absorption, and biodegradation. Results suggest that chitosan incorporation enhances tensile strength and water vapor permeability. The films partially block the UV radiation and degrade 90% in 40 days at 24% soil moisture. The soyhull-derived chitosan-cellulose films are cost-effective and offer biodegradable packaging solutions with enhanced mechanical strength and environmental sustainability.

Keywords: Microplastic, sustainable, soyhulls, cellulose, chitosan, biodegradable

Valorization Of Agro-industrial Wastes: Study of The Microencapsulation Of A Multi-Source Antioxidant-Rich Extract

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ABSTRACT

Certain agro-industrial wastes contain considerable amounts of antioxidant compounds which can be used for food functionalization or nutraceutical formulations. Synergistic effects have been reported in the antioxidant and medicinal properties of combinations of citrus flavanones, vitamin C, and rutin from *Capparis spinosa*. The microencapsulation of hydroalcoholic extracts of caper leaves and orange albedo, in combination with orange juice, was assayed by spray drying. The effect of the drying air inlet temperature and maltodextrin concentration on the bioactive composition of the powders was evaluated. A response surface design was proposed with factors at three levels: air inlet temperature = 130, 140 and 150 ºC and maltodextrin concentration = 60, 70 and 80% (w/w active solids). The powders obtained were characterized in terms of phenolic and ascorbic acid contents, antioxidant activity, moisture content and glass transition temperature. Models showed that glass transition temperature increased with maltodextrin concentration. Regarding moisture, drier powders were obtained when both factors increased. Total phenolic content was affected by air inlet temperature, due to thermodegradation. In the case of ascorbic acid content, both factors were statistically significant. Higher concentrations were observed when maltodextrin concentration augmented, probably due to lower moisture content of the particles. On the other hand, a maximum ascorbic acid content was found for intermediate values of air inlet temperature, while for high temperatures thermodegradation effect was dominant. Finally, antioxidant activities increased with maltodextrin concentration, as for all bioactive compounds. The optimum microencapsulation parameters were found to prepare highly active antioxidant powders harnessing from agroindustrial wastes.

Keywords*:* antioxidants, phenolic compounds, ascorbic acid, agroindustrial subproducts, surface response methodology.

A Review on Non-Thermal Processing Techniques for The Extraction of Millet Seed Protein

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ABSTRACT

Plant-based protein sources, including grains such as millets, are gaining global recognition for their role in promoting sustainable food systems. Millets, nutrient-dense and gluten-free, are rich in protein and fiber, making them valuable for addressing malnutrition and developing functional foods. However, efficient extraction of millet seed protein is challenging due to anti-nutritional factors and complex protein-starch-lipid interactions. Traditional thermal methods often cause protein denaturation, reducing nutritional and functional properties. Whereas, non-thermal processing (NTP) techniques have emerged as sustainable alternatives that enhance protein yield while preserving structural integrity and bioactivity. NTP methods include ultrasound-assisted enzyme extraction (UAE), pulsed electric field (PEF), microwave-assisted extraction (MAE) and high-pressure processing (HPP). These techniques rely on cavitation, electroporation, pressure-induced cell disruption, enzymatic hydrolysis, and dielectric heating, respectively, to break cell walls and improve protein recovery. Factors influencing extraction efficiency include processing time, solvent type, pH, particle size, and treatment intensity. NTP methods offer advantages such as higher protein solubility, improved functional properties, and reduced energy consumption compared to conventional approaches. This review provides a summary of non-thermal processing techniques for extracting millet seed protein, highlighting their mechanisms, benefits, and challenges of NTP techniques for millet protein extraction, highlighting their potential in food applications.

Keywords: Non-thermal processing Techniques, Millet seed protein extraction, Protein solubility, Functional properties, Sustainable food systems.

Development And Nutritional Evaluation Of Biscuits Incorporating White Finger Millet (KMR-340) And Parbhani Shakti Sorghum

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ABSTRACT

White finger millet (KMR-340) and Parbhani Shakti sorghum were selected as primary ingredients for biscuit development due to their exceptional nutritional qualities. Parbhani Shakti is the first biofortified sorghum in India, developed by VNMKV, Parbhani, in collaboration with ICRISAT, Hyderabad, known for its enhanced micronutrient content. White finger millet (KMR-340), developed by VC Farm Mandya under UAS Bangalore, is a low anti-nutritional millet with negligible tannins, specifically bred for bakery applications. Their combination provides a unique blend of protein, fiber and essential minerals, making them ideal for creating functional and nutrient-dense food products. This study focuses on the development and evaluation of biscuits using these millets, subjected to various pre-treatments: raw, roasted and malted. Standard procedures were employed for nutritional and quality assessment, including sensory evaluation. Sensory attributes such as colour, flavor, texture, taste and overall acceptability were assessed for biscuits prepared from raw flours (T1 to T5), roasted flours (R1 to R5), and malted flours (M1 to M5). Among the raw flour biscuits, T4 received the highest overall acceptability score (8.56), while T5 scored the lowest (7.78). For roasted biscuits, R4 scored highest in taste (8.36) and overall acceptability (8.47), followed by R3. The malted flour biscuits demonstrated superior sensory qualities, with M4 emerging as the best (overall acceptability: 8.64), indicating malting's positive influence on flavour, taste and texture. Nutritional analysis revealed that selected malt biscuits had higher protein (9.40 g/100g), ash (2.63 g/100g) and fiber (2.25 g/100g) content compared to control biscuits. They also exhibited enhanced mineral profiles, with increased levels of calcium (182.17 mg/100g), iron (4.37 mg/100g) and zinc (3.72 mg/100g). Digestibility studies showed improved in vitro protein (80.00%) and starch digestibility (75.40%) in malted biscuits, suggesting better nutrient absorption and utilization. Physico-chemical properties highlighted that malt biscuits were slightly heavier, with a larger diameter and improved colour attributes, including higher lightness (L: 71.11). Overall, this study highlights the potential of using pre-treated millet flours, particularly malted flours, in developing biscuits with superior sensory appeal and improved nutritional profiles. The combination of KMR-340 and Parbhani Shakti sorghum not only boosts health benefits but also supports the development of functional foods, promoting the use of underutilized grains for sustainable nutrition.

Keywords: White finger millet, Parbhani Shakti sorghum, Pre-treated biscuits, sensory evaluation, nutritional analysis and sustainable nutrition

Inulin as a Functional Ingredient in Food: Technological Applications, Stability, and Consumer Acceptance

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ABSTRACT

Inulin, also a soluble dietary fiber, at one time was the luxury lead-source of attention with multiple health benefits-from potential prebiotic properties to enhanced mineral uptake. Naturally rich in dietary fiber, its special physicochemical properties make it an appropriate fat replacer in functional foods and studies have shown that Konjac mannan can successfully replace up to 50% of the fat with likeness nutrient, textural and storage characteristics. Research on inulin-fortified products is scarce, but it can facilitate the development of new formulas. This review delves into the utilization of inulin across a range of functional foods, including Beverages, Dairy & Bakery and Confectionery. This emphasises the benefits of inulin (such as contributing to mouthfeel & reducing calorie), but also considers potential challenges including formulation issues, flavour acceptance etc. Several future research directions are disclosed to drive invention, developing healthier, and more convenient food products enriched with Inulin that meets consumer demand for nutrient-dense foods provided as a functional ingredient.

Keywords: Inulin, mineral enriched, dietary fibre, functional food

A Comprehensive Study on the Development and Optimization of Functional Cookies Based on Finger Millet and Jaggery Using Simplex Lattice Mixture Design Approach and Correlation Between Quality Parameters

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ABSTRACT

Functional cookies with improved nutritional values were prepared using finger millet (FMF: 0–100%), whole wheat flour (WWF: 0 – 100%) and 60% jaggery granules as a natural sweetener. The study analysed physical characteristics (spread ratio, hardness), chemical properties (moisture, fiber, protein, fat, ash, carbohydrate, calcium, magnesium, potassium, phosphorus, iron content), color attributes (L*, a* and b* values chroma (C_{ab}), hue angle (h^0_{ab}), and global color change (ΔE), DPPH antioxidant activity, and sensory attributes. Numerical optimization techniques identified combinations producing cookies with desired nutritional content. Moisture, protein, ash, fiber, and fat values ranged from 2.13-2.19%, 4.02-6.5%, 1.41-2.5%, 0.36-2.02%, and 17.5-17.83%, respectively. Iron, calcium, and phosphorus contents varied from 1.5-2.85 mg/100 g, 36.1-349.22 mg/100 g, and 160-230 mg/100 g, respectively. The interaction between WWF and FMF models significantly influenced hardness (3543-10567 g) and L* (38.31-71.69) values. Linear, quadratic, cubic, and quartic models for all responses were significant ($p < 0.05$), with adjusted R^2 ranging from 0.59-0.99 for physical characteristics and 0.82-0.99 for chemical characteristics. Based on lowest hardness and highest sensory score, the optimized formulation was 49.062% WWF and 50.938% FMF, corresponding to a desirability of 0.93 with protein, fat, ash, calcium and iron contents of 6.12%, 17.10%, 2.20%, 302.11 mg/100 g, and 2.55 mg/100 g respectively.

Keywords Finger Millet, Functional Product, Jaggery, Optimization, Simplex Lattice Mixture Design

Development Of Crackers Using Buckwheat and Defatted Soy Flours

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ABSTRACT

Snack foods play a crucial role in improving nutritional status, and incorporating novel ingredients can enhance their health benefits. In India the snacking culture in adolescents is rising and there is a need to introduce nutritious snack options. Market survey was conducted both online and in stores to find snack options, there were more junk foods compared to healthy snack options. Hence, there is a need to address this disparity by providing healthy options with high nutritional value. Aim of this study was to develop crackers by incorporating Buckwheat Flour (BWF), Defatted Soy Flour (DSF), Maize Flour (MF) and Refined Wheat Flour (RWF) which is rich in protein and calcium. Various formulation and baking parameters were studied. Results indicated that formulations baked at 160 ℃ for 17 minutes emerged as the most promising based on their superior characteristics such as texture, taste, and overall quality. Sensory evaluation of crackers on a 9-point hedonic scale was conducted and the result indicted that among two variations tested A1 (RWF 10%+ BWF 35%+MF 20%+ DSF 35%) and A2 (RWF 10%+ BWF 30%+MF 20%+ DSF 40%), the most accepted variation was A1 with overall acceptability score of 7.6. As per the nutritional analysis crackers contained 5.56g/100g of moisture, 24.76g/100g of protein, 7.08g/100g of fat, 6.15g/100g of total ash, 56.45g/100g of carbohydrates and 389 kcals/100g of energy. The protein digestibility (78.86g/100g) and calcium bio accessibility (31.31%) and amino acid profile were also assessed for the developed crackers. The positive sensory evaluation underscores the acceptability of these crackers among the semi trained panellists, indicating their feasibility as a healthy snack option.

Keywords: Crackers, Buckwheat Flour, Defatted Soy Flour, Sensory Evaluation, Nutritional Analysis

Development Of Multigrain Baked Bhakarwadi

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ABSTRACT

Millet flour has long been a staple in the Indian diet, with pearl millet (Bajra) being a preferred option due to its culinary versatility and nutritional benefits, including high protein content and gluten-free properties. This study aimed to develop a more nutritious baked Bhakarwadi snack by substituting refined flour with a blend of pearl millet, corn, and rice flour. Four formulations were evaluated: T1 (100% refined flour), T2 (80:15:5), T3 (60:30:10), and T4 (40:45:15), with T2 demonstrating the highest consumer acceptance. The multigrain Bhakarwadi exhibited a nutritional composition of 420.2 Kcal energy, 7.37% moisture content, 11.7% protein, 16.5% fat, 49.2% carbohydrates, and 2.8% ash. Mineral analysis of the optimized T2 sample revealed Calcium (Ca) 43 mg/100 gm, Phosphorus (P) 263 mg/100 gm, Magnesium (Mg) 143 mg/100 gm, and Potassium (K) 489 mg/100 gm. Microbiological tests confirmed that T2 remained safe for consumption for up to 90 days and maintained high acceptability throughout the storage period, suggesting that these baked Bhakerwadi are nutritious and appealing to health-conscious consumers.

***Keywords**:* Multigrain, Pearl millet, Corn flour, Rice flour, Baked Bhakarwadi.

Pulsed Electric Field Technology for Food Preservation

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ABSTRACT

Thermal preservation techniques are generally used for preservation of foods and their quality. But these techniques result in undesirable changes in food and their nutritional attributes. Whereas non thermal techniques have minimal effect on quality of food. Pulsed electric field (PEF) technology serves as a promising non-thermal approach to food preservation, effectively eliminating microorganisms while preserving the nutritional value and sensory characteristics of food. PEF apply short bursts of high voltage electric fields (10-80 kV/cm) for microseconds to milliseconds to induce electroporation in microbial cell membrane which leads to their inactivation. This technique is broadly used for preservation of liquid foods such as milk, juices providing great shelf life along with preserved quality and nutritional status. In addition to that this technique is used to improve mass transfer in solid foods while drying, freezing and extraction. This study focuses on the role of PEF in food processing along with its principle, associated factors and process parameters, its effect on food quality and its application in food industry.

Keywords: Pulsed electric field, non-thermal preservation, food preservation, food quality and safety.

Optimization of Okra Polysaccharide Extraction Using Response Surface Methodology

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ABSTRACT

Okra polysaccharides hold significant potential in food and pharmaceutical applications due to their functional properties. This study aims to optimize the extraction of polysaccharides (mucilage) from *Abelmoschus esculentus* using Response Surface Methodology (RSM). The objectives include (1) studying okra drying kinetics using a cross-flow dryer, and evaluating physicochemical properties to select the optimal drying temperature, (2) comparing normal and ultrasound-assisted extraction methods for maximizing polysaccharide yield, (3) optimizing polysaccharide (mucilage) yield (dependent variable) using RSM to analyze the effect of independent variables (sample-solvent ratio, treatment time, and temperature), and (4) determining the functional properties of the optimized polysaccharide. Drying kinetics results indicated that first-order kinetics [$\ln(Mt) = \ln(M0) + kt$] best described the drying process of okra with R^2 values of 0.9862, 0.9292, and 0.9310 for 60°C, 70°C, and 80°C, respectively. Analysis of Variance (ANOVA) confirmed significant differences ($p < 0.05$) in swelling index, water holding capacity, and solubility, highlighting the impact of drying temperature on powder functionality. Okra powder dried at 60°C exhibited the highest swelling index and solubility, suggesting its suitability for mucilage extraction. Preliminary studies on extraction using ethanol precipitation (99.9% v/v) yielded 12.85% okra mucilage, which was subsequently freeze-dried for functional property analysis, focusing on emulsifying capacity. Future research will optimize extraction methods using RSM and assess functional properties to enhance the application of okra polysaccharides in food and pharmaceutical industries.

Keywords: Drying Kinetics, Ethanol precipitation, Functional properties, Okra Polysaccharides, Physicochemical properties, Response Surface Methodology.

Unlocking the Potential of Pumpkin Seeds in Food Applications: A Comprehensive Review

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ABSTRACT

Pumpkin (*Cucurbita maxima*) has garnered significant attention due to its health-protective properties with high nutritional composition. Pumpkin seeds, often considered waste, have significant nutritional value due to their extensive use in food, which enhances their nutritional and sensorial attributes. Pumpkin seeds are natural thickeners for soups and curries and are also eaten raw, roasted, or salted. Pumpkin seed flour can be used in baked goods in amounts ranging from 2.5% to 15%, which increases lysine, unsaturated fatty acids, and antioxidants, enhances the texture, and sensory qualities, and improves the color and acceptability of the crust. Additionally, supplementary drinks fortified with pumpkin seed powder in a level of 30% to 87.45%, significantly boost the macronutrient content including zinc, iron, and antioxidants, with increased acceptability and shelf life. The in vivo studies on rats indicate that pumpkin seed oil supplements can protect against atherosclerosis with improved lipid metabolic profiles. Furthermore, research on children shows that pumpkin seed paste may dramatically raise blood levels of vitamins, zinc, and iron, demonstrating its potential to address malnutrition in low-income groups. In meat products, chicken burgers with a 2% addition of pumpkin seed flour exhibit increased antioxidant properties, while beef patties with 60 g of pumpkin seed inclusion increase juiciness and protein content. The versatile application of pumpkin seeds across various food systems promotes waste management with enhanced nutritional and sensory properties. This review explores the incorporation of pumpkin seeds into different food applications, detailing the incorporation ranges and their impact on food quality.

Keywords: Pumpkin seeds, nutrients, sensorial property, food application.

Bio-Based Synthesis of Antimicrobial Nanoparticles From Butea Monosperma And Hibiscus-Rosa Sinensis For Enhanced Packaging Application

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ABSTRACT

The development of biodegradable food packaging with enhanced functional properties is crucial for sustainable food preservation. This study focuses on the green synthesis of nanoparticles from Butea monosperma and Hibiscus rosa-sinensis leaves and their incorporation into nanocomposite films. The nanoparticles were synthesized using an eco-friendly approach and characterized using Fourier Transform Infrared Spectroscopy (FTIR) for functional group analysis, X-ray Diffraction (XRD) for crystalline structure determination, Scanning Electron Microscopy (SEM) for morphological analysis, UV-Visible Spectroscopy for optical properties, and Zeta Potential analysis for surface charge measurement. The nanoparticles, with an average size of 350 nm, exhibited significant antibacterial activity against Staphylococcus aureus and Escherichia coli, as confirmed by the agar well diffusion method. Three types of nanocomposite films were developed: (i) protein/carbohydrate based (ii) protein-carbohydrate blend (iii) protein-carbohydrate-lipid composite. The nanoparticles were incorporated into these films at concentrations of 1:100, 1:200, and 1:300 (nanoparticle-to-film matrix ratio). The results demonstrated improved antimicrobial efficacy, thermal stability, and mechanical properties, with the protein-carbohydrate-lipid film exhibiting the highest barrier performance and durability. Characterization studies confirmed uniform nanoparticle dispersion within the biopolymer matrix, contributing to enhanced packaging properties. The developed biodegradable films offer a sustainable and cost-effective solution for food packaging, promoting food safety, extended shelf life, and reduced environmental impact and waste reduction. This study highlights a cost-effective, environmentally friendly approach to synthesizing bio-based nanoparticles and their effective integration into biodegradable food packaging materials.

***Keywords**:* Antimicrobial activity, biodegradable packaging, *Butea monosperma*, food safety enhancement, sustainable food preservation

Impact Of High-Pressure Processing on The Quality and Shelf-Life Extension of Seafood.

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ABSTRACT

Among the recent advanced technologies, high-pressure processing (HPP) a non-thermal preservation method has emerged as an attractive tool for inactivating microbial populations and endogenous enzymes activity, resulting in extension of shelf life. Seafood products including finfish, shellfish, and crustacean, primary high-quality protein source, are one of popular food products in many human populations. Optimal HPP treatment (400-500 MPa for 3-5 minutes) significantly extends refrigerated shelf life by 2-3 times compared to traditional methods by reducing pathogenic and spoilage microorganisms by 2-6 log CFU/g while largely preserving nutritional components, including omega-3 fatty acids and essential amino acids. The review highlights HPP's advantages over conventional thermal processing, including reduced histamine formation, decreased drip loss, and maintained organoleptic properties. Impact of High-Pressure Processing on textural modifications in fish muscle, color changes in crustaceans, and enzymatic activities affecting quality deterioration is reviewed in this paper. This paper highlights recent technological advances in equipment design and process optimization with emerging applications of HPP in value-added seafood product development. Economic considerations, regulatory status, and consumer perception are discussed as factors influencing commercial implementation.

Keywords: HPP, organoleptic properties, seafood, shelf life, textural modification,

Liposomal Technology: A New Approach of Improving Functionality & Bioavailability of Active Molecules In The Food Industry

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ABSTRACT

Liposomes were described for the first time in 1961 by Alec Bangham. Liposomes are composed of one or more phospholipids which are widely used in pharmaceuticals for targeted drug delivery as liposomes can encapsulate both hydrophilic and hydrophobic drugs. It is also used in cosmetic industries for better absorption of active ingredients (like vitamins and antioxidants) in skin. In food industries liposomes can play an important role in encapsulation of the bioactive compounds. It also helps with the controlled release of food preservatives which ultimately helps to increase the shelf life of products and so far, studies have been done on digestive behavior. liposomal technology can also be used in functional foods and nutraceuticals for better core stability and bioavailability. This technology has a very wide range of applications in anticancer, antibacterial and antiviral therapies. This review paper puts spotlight on liposomes, its preparation techniques, advantages, limitations and its applications in functional foods and overall food industries. Also, it will give insight into recent advances in liposomal technology.

Keywords: bioavailability, encapsulation, functional foods, liposomal technology, therapies

Drying of Tomatoes Using Refractance Window Drying Technology and its Impact on Lycopene Retention

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ABSTRACT

This research examined the quality properties of tomato powder produced using the Refractance Window (RW) drying method. The RW drying system employs circulating hot water to transfer thermal energy to the materials being dehydrated. Tomatoes are spread on a transparent plastic conveyor belt that moves over circulating water in a shallow trough. Various heating water temperatures (60, 70, 80, and 90 °C) and pulp thicknesses (4 mm and 6 mm) were tested. The powder's characteristics were evaluated based on solubility, dispersion time, and color. Measurements were taken for density, water solubility, vitamin C content and total polyphenol compounds of the tomato powders. Generally, the RW drying method resulted in significant retention of antioxidant compounds, including L-ascorbic acid and lycopene which have been observed in tomato powder produced under different RW drying conditions.

Keywords: antioxidants, lycopene, tomato powder, refractance window drying technology.

Novel Biodegradable and Sustainable Packaging Films from Binary mixtures of Alfalfa Cellulosic residue and Carrageenan

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ABSTRACT

Plastic is a dominating packaging material but poses environmental and health concerns due to its non-biodegradability. Though starches, proteins, and lipids offer biodegradable options, their essential need for meeting food security warrants a search for alternatives. To this end, cellulosic residue from biowaste stands out as a viable choice. This study demonstrates how cellulosic residue from alfalfa biomass can develop biodegradable packaging films and enhance mechanical and barrier properties by complexing with carrageenans. Alfalfa cellulosic residue (ACR) was extracted using alkaline and bleaching treatments. ACR was solubilized in 68% ZnCl2 and complexed with iota- (ι), kappa- (κ), and lambda- (λ) carrageenan solutions (0.5, 1, and 1.5%), separately, crosslinked with calcium ions and sorbitol. Nine ACR-carrageenan films were prepared and analyzed for tensile strength, elongation at break, water vapor permeability, color, UV-Vis-IR transmittance, water solubility, hydrophobicity, water uptake kinetics, and soil biodegradability. ACR films were used as the control films. Statistical analysis was performed using R software and Microsoft Excel. The addition of carrageenan enhanced the tensile strength (TS) of films but with reduced elongation at break (EB) and a subtle change in water vapor permeability (WVP). The water solubility and water absorption significantly increased, particularly with the presence of lambda-carrageenan. The films followed Peleg's water absorption kinetics, exhibited second-order biodegradation kinetics, and degraded within 40 days at 24% soil moisture. The outcome offers novel biodegradable packaging films, addresses plastic perils supporting sustainability and circular bioeconomy, and a new income pathway for alfalfa farmers, estimating a yearly 5.44-6.12 billion USD globally.

Keywords: alfalfa field residue, biodegradable packaging, carrageenan, plastic perils, sustainability

Exploration of Enzyme Modified Psyllium Fibre in Probiotic Frozen Dessert

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ABSTRACT

The present research includes standardization of the process for partial hydrolysisof psyllium husk by using xylanase enzyme. At the reaction temperature of 55.0°C for 2.5 hours, psyllium husk was treated with 25, 30 and 35 units per gram of xylanase enzyme. Based on the results of partial hydrolysis on functional properties of psyllium husk, xylanase enzyme concentration of 25 units per gram was selected to be incorporated in probiotic frozen dessert. Probiotic frozen dessert was prepared by adding 0.5, 0.75 and 1.0 gm of xylanase enzyme modified psyllium husk. The probiotic culture (10^7, 10^8, 10^9 cfu/gm) containing 5 percent equal proportions of *Lactobacillus acidophilus* and *Lactobacillus plantarum* were added in encapsulated form. It was then stored at refrigerated conditions at 4°C for 08 hours. As per the sensory score of 9-point hedonic scale, probiotic frozen dessert prepared with 0.5 gm of enzyme modified psyllium husk had shown maximum consumer acceptability (8.8) among all samples.

Keywords: Frozen dessert, isabgol, lactic acid bacteria, probiotic dessert, psyllium husk.

Biocomposites Revealed: Response Surface Modeling for Maximizing Flavonoid Recovery in Yellow Kiwifruit Peel

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ABSTRACT

The growing concern about food waste has prompted research into agro-industrial by-products as a valuable source of bioactive compounds with potential health benefits. In the kiwifruit industry, large quantities of peel are discarded daily despite its richness in bioactive molecules. Among them, flavonoids stand out for their antioxidant properties and extensive applications in the pharmaceutical, nutraceutical, and food industries. To promote the use of this by-product, efficient extraction techniques are essential to maximize flavonoid recovery and facilitate the valorization of the peel as a valuable resource. In this context, this study aimed to identify and optimize the extraction of flavonoids from the peel of *Actinidia chinensis* (yellow kiwi) by applying the microwave-assisted extraction (MAE) technique. This optimization was achieved using response surface modeling (RSM), considering three variables: *ethanol concentration* (0-100%), *extraction time* (5-25 min), and *temperature* (50 to 175 ºC). The peel of *A. chinensis* included epigallocatechin (3.93 mg/g E), known for its anti-inflammatory and anticancer properties, as the predominant flavonoid. The optimal extraction conditions were 100% ethanol, 50 ºC, and 25 min. However, a shorter extraction time (5 min) also allowed for the quantification of additional flavonoids, including rhiofolin (3.89 mg/g E) and dihydroisorhamnetin (2.81 mg/g E). In conclusion, the optimized extraction conditions provide an efficient method for isolating flavonoids from yellow kiwi fruit by-products, which could be utilized to develop functional foods, dietary supplements, and other value-added products. Further research into these compounds' biological activities and scalability could enhance their commercial viability.

Keywords: *Actinidia chinensis*, kiwi, microwave-assisted extraction, response surface methodology, bioactive compounds, flavonoids.

Formulation And Nutritional Characteristics Of Crackers Prepared From Germinated Amaranth And Wheat Flour

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ABSTRACT

Amaranth is a rare crop that researchers are interested in because of its unique nutritional characteristics (higher protein content, gluten-free, bioactive compounds) and therapeutic value. The present study was conducted to formulate crackers from germinated amaranth flour & wheat flour and determine their sensory, nutritional, mineral, and microbiological properties. One control sample and four test samples were formulated, incorporating germinated amaranth flour in different proportions ranging from 20, 50,80 & 100%. Crackers formulated with sprouted wheat flour (100%) were served as a control. All five samples were subjected to organoleptic evaluations, and based on that one test, a sample was selected for further analysis. The T2 test sample, out of all prepared samples, was selected and scored highest (8.30±0.48) in sensory evaluation by the panelists based on their color, texture, flavor, taste & overall acceptability. The nutritional content of the macronutrients and major micronutrients of the more acceptable sample (T2) in sensory evaluation was tested, and the control and experimental samples were determined. The nutrition analysis of T2 was reported as 74.48g/100g, 461.47 kcal/100g, 14.67g/100g, 6.98g/100g & 8.61g/100g for carbohydrates, energy, fat, protein, and total sugar, respectively. The mineral content of the test sample was also reported higher than T0, i.e., 220.73mg/100g, 10.91mg/100g, 176.86mg/100g, 1274.09mg/100g & 31.72mg/100g for calcium, iron, magnesium, sodium & zinc, respectively. The developed product was analyzed for shelf-life (microbial plate count), and no growth was recorded for either of the samples that were kept at ambient & refrigerated temperatures in prepared media plates (nutrient agar, MacConkey agar & blood agar) for 7 consecutive days. The formulated product is priced between Rs. 25.85 for T0 and Rs. 33.22 for T2. Therefore, it can be inferred from this study that germinated amaranth flour can be used as a potential source for enhancing the nutritional value of any food choice.

Keywords: Crackers, Sensory properties, Proximate analysis, shelf-life

Process Development and Sensory Evaluation of Cereal Based Probiotic Beverages Using Natural Cultures

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ABSTRACT

The present study focuses on standardizing the process of preparation of cereal based probiotic drink using white rice, red rice, sprouted finger millets, sprouted pearl millets, sprouted sorghum and sprouted barley individually. Oats, stabilizers, sugar and plant milks were used for standardizing the drinks using natural starter cultures of cereals and millets. Acidity (in terms of lactic acid) and pH in different probiotic drink ranged from (0.388-0.455%) and (4.3-4.9) respectively. The probiotic count ranged from 4.2-4.5, 6.0-6.3,5.5-5.6,7.7-7.8, 3.1-3.4,6.3-6.4 log9 cfu/ml in white rice, red rice, sprouted finger millets, sprouted pearl millets, sprouted sorghum and sprouted barley probiotic samples respectively with fermentation time of 10-12 hours. The count increases with increasing level of raw cereals and millets. The sensory acceptability >7 with good probiotic count was observed in both rice varieties with 50 ml of plant milk and 5% natural starter culture. For the millets, 9:1 ratio for finger millets and barley with plant milk and 5:5 for sorghum and pearl millet with plant milk was found proportionate along with 5% starter culture for development of probiotic beverage using cereals and millets. The protein and TSS was found high in sorghum and finger millet with 2.06 % and 14.1(0Bx) respectively. The process of preparation of cereal based probiotic beverage being a techno economically feasible, justified the suitability of cereals in probiotic based functional food for commercial exploitation.

Keywords: Rice, millets, fermentation, probiotics, sensory study.

Plant Based Protein Extrudates: An Alternative to Animal Meat

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ABSTRACT

This review paper aims to propose an alternative solution to traditional animal meat products, aiming to reduce carbon footprint and promoting sustainable, protein-rich vegetarian food. These extruded products possess high protein content derived from plants, which are both economically viable and health-promoting. The development and expansion of these extruded products in the food industry are crucial for mitigating the negative impacts of conventional livestock farming, including the emission of harmful greenhouse gases, excessive land use, deforestation, excessive water consumption, and ethical concerns related to animal welfare. Initial studies have shown that plant-based foods such as tofu, seitan, jackfruit, and various others have been utilized and continue to be used as meat substitutes globally. The rapid development of lab-grown meat and plant-based meat analogues in recent decades is noteworthy. The process of producing meat in laboratories involves initiating with a single animal mother cell, replicating it in a nutritional solution based on genetics, and then incorporating other nutritional elements that bind and produce the desired meat component. This approach eliminates the need for animal rearing, care, and eventual slaughter. Current plant-based analogue techniques have not yet reached their full potential in terms of flavor and textural factors, as the results obtained in these present phases do not fully replicate animal meat. However, plant-based products are sustainable, easily produced, and can be readily modified and fortified according to environmental, regulatory, and physiological requirements. The produced foods are rich in protein, vitamins, and other necessary nutritional factors.

Keywords*:* Animal meat, Plant based protein extrudates, Sustainable alternative, Vegan Meat

Formulation And Characterization of Turmeric Essential Oil Encapsulated Powder for Applications in Dairy-Based Products

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ABSTRACT

The benefits of encapsulation in preservation of bioactive compounds *e.g.* essential oil (EO) can also overcome its application difficulties such as instability, low water solubility, and bioavailability. In this study, turmeric-essential oil (TEO) loaded nano-encapsulates were prepared using the microfluidization technique, coupled with high shear homogenization and drying process at different ratios of the milk protein to polysaccharide complex (1:1, 1:2 and 2:1). Colloidal properties of nanoemulsions (NE) such as particle size, ζ-potential, polydispersity index (PDI), encapsulation efficiency (EE), antioxidant activity, and emulsion stability were investigated. The optimized TEO nano-emulsion with milk protein to polysaccharide ratio of 1:2 had particle sizes of d<300 nm, zeta potential (−24.9 to −27.4 mV), low size distribution (PDI<0.25), EE >40% and relatively stable during 40 days of storage at room temperature. Fourier transform infrared spectra (FTIR) and scanning electron microscopy (SEM) analysis showed the embedding of the TEO in the milk protein-polysaccharide matrix. Encapsulation of TEO aided in the retention of antioxidant properties for upto one month which indicates its potential in functional dairy-based product applications.

Keywords: Antioxidant activity**,** Encapsulation, Microfluidization, Turmeric Essential Oil

Optimization And Characterization of Fermented Honey (MEAD)

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ABSTRACT

Fermented honey, mead, is one of the oldest alcoholic beverages traditionally made by fermenting honey, water and yeast. Its quality depends on fermentation conditions. This study investigates the physicochemical properties of fermented honey (mead), made by three different methods: (1) organic honey with dry baker's commercial yeast, (2) organic honey with water only (wild fermentation), and (3) organic honey with La Casa brewer's wine-making yeast. The honey-to-water ratio of 1:3 was used, with yeast additions of 0.2 g for baker's yeast and 0.4 g for brewer's yeast. Fermentation was monitored over two weeks, analyzing Brix (sugar content), pH, and titratable acidity to assess fermentation efficiency and product stability. Results showed that the type of yeast played a crucial role in fermentation. The La Casa brewer's yeast batch exhibited the highest sugar reduction, a steady decline in Brix levels (T0:25.8-T14:11), and balanced acidity (T0:0.2- T14:1.1), leading to enhanced alcohol yield and refined flavours. The baker's yeast fermentation showed moderate sugar conversion with a simpler flavour profile. The wild fermentation method had the slowest sugar reduction and fluctuating acidity due to unpredictable microbial activity, which could contribute to complexity but pose challenges in consistency. Over the two-week study, pH levels (T0:4.47- T14:3.19) declined across all batches, reflecting increased acidity from fermentation. Titratable acidity increased in all trials, with the brewer's yeast batch maintaining the most stable balance. Future work will focus on studying the shelf life of fermented honey, mead, and exploring the incorporation of different flavours to enhance sensory appeal and product variety for commercial brewing.

Keywords: Mead, Brewing, fermented honey, sugar reduction

From Waste to Wealth: Exploring the Potential of Musa acuminata Residues in Mushroom Cultivation

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ABSTRACT

The utilization of agricultural byproducts in sustainable farming practices has sparked considerable interest. The potential of banana waste and stem, which are rich in vital nutrients and bioactive substances, to enhance mushroom development has been investigated. Despite being widely grown for their fruit, bananas (Musa spp.) are frequently discarded for their stems and debris, which poses a problem for the environment. According to a study published on NCBI, after harvest, about 60% of banana biomass is left as waste. Worldwide, roughly 114.08 million metric tons of banana waste are produced, resulting in environmental problems such as the excessive release of greenhouse gases. These by-products may be repurposed to improve mushroom growing, according to recent studies. For optimum growth, mushrooms need a nutrient-rich, balanced substrate, and extracts from banana stems have been shown to enhance substrate quality. The antimicrobial properties of banana-derived solutions may also reduce contamination risks, thereby improving mushroom yield and quality. The vital elements potassium, magnesium, fiber, and polyphenols found in banana stems and waste support its biological processes. The effects of a solution made from banana waste and stem on mushroom growth, yield, and substrate improvement are covered in this review. It provides a comprehensive analysis of the potential of banana-based solutions to serve as eco-friendly and sustainable alternatives in mushroom cultivation. The study also emphasizes how bioactive substances aid in the prevention of contamination and the promotion of fungal growth. Applications and future research prospects in sustainable agriculture are also reviewed.

Keywords: Banana stem, banana waste, mushroom cultivation, sustainable agriculture, bioactive compounds, antimicrobial properties, substrate enhancement, nutrient-rich substrate, fungal growth.

Real Time Deep Learning Model for Food Item Identification and Recipe Data Generation

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ABSTRACT

Accurate and fast identification of various food items can be very useful, in terms of preventing harm caused by allergies and other vulnerabilities, and to allow easy access to reliable information about food to make informed choices. In this work, an attempt is made to classify food items from real-world images with great accuracy and in real time. The proposed model is designed in a dual-phase classification method incorporating unsupervised clustering followed by a classification model to improve the initial prediction results. The dataset, selected primarily for its various food classes, consists of real-world images of food, captured outside controlled conditions. During the first stage, clustering is used to group class predictions into clusters. In the next stage, the model for the cluster with the highest prediction value is loaded to make the final prediction. Each cluster model is trained on a small subset of classes, reducing time and cost and improving performance. The accuracy metrics of the general model and some of the sub-models are compared to see if using smaller label subsets provides improved performance without large increase in training time. Finally, for the generation of detailed information about food items and suggested recipes, an LLM will be integrated with the proposed model. Custom prompting will be employed to generate contextually relevant data more effectively.

Keywords: YOLO, Deep Learning, clustering, LLM, classification

Recent trends in the application of Xanthan based films and coatings in Food Packaging

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ABSTRACT

This review explores the early advancements in xanthan gum- based edible films and coatings for the applications in the food packaging industries. The increasing global concern about the use of plastic pollution has accelerated the research about biodegradable packaging alternatives. Xanthan gum is emerging as a favourable biopolymer as it has excellent film-forming capacity, sustainability and other rheological properties. Recent innovations include the synthesis of composite edible films by blending xanthan gum with other biopolymers like starch, chitosan, and cellulose derivatives as it helps to improve its mechanical and barrier properties of xanthan gum based edible films. Notable improvement has been achieved in the active packaging systems where xanthan gum aid as an effective organic biopolymer for incorporating different antimicrobial agents, antioxidants, and other controlled release systems. Edible coating applications expanded to various food sectors with significant effectiveness in increasing the shelf life of food product. Although it has many applications but commercializing it on large scale is main challenge including cost effectiveness, scaling production, and securing uniform performance. This review highlights the potential of xanthan-based materials to contribute significantly in the sustainable food packaging solutions while pointing out the critical areas requiring more research to ease broader market adoption.

Keywords: Active packaging; Biodegradable films; Composite biopolymers; Edible coatings; Xanthan gum;

Smart Packaging Technologies: Revolutionizing Product Shelf-Life Management

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ABSTRACT

Food safety is a major concern in the modern world. With the increasing population need for food is increasing day by day, to fulfill this increased need shelf-life monitoring plays an important role by contributing in storage, transportation and distribution. The traditional ways of shelf-life monitoring depend only on methods like expiry date and best before. This technique does not provide real-time conditions for food. Shelf-life indicators (SLIs) are modern and smart ways to monitor the effect of pH, temperature, water activity, and microbial activity. Time-temperature indicators, freshness monitors, and integrity sensors employ chromatic technologies, digital integration, and chemical reactions to communicate critical data regarding product quality and safety. These factors allow for monitoring real-time conditions and freshness of food. The review focuses on the temperature indicators used in packaging, its mechanism and future demand. The implementation of these technologies offers substantial benefits, including reduction of waste, enhancement of consumer safety, optimization of supply chain management, and support for sustainability initiatives. This helps to assist with quality and shelf-life management. This review explores the SLIs applications highlighting their role in extending and accurately predicting the shelf-life of food.

Keywords: food safety, indicators, packaging, Shelf-life, temperature.

Comparative Study Between Native and Modified Starches Isolated from Tamarind Seed

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ABSTRACT

Starch is a complex carbohydrate polymer produced by plants and especially by crops in huge amounts. It consists of amylose and amylopectin which have α-1,4- and α-1,6-linked glucose units. Seeds represent a potential source of starch, containing at least 60–70% of total starch, however many of them are treated as waste and are usually discarded. Tamarind seeds known to be high in Xyloglycan. The tamarind pulp industry's underutilised byproduct, the seeds, has been proposed as a low-cost source of raw materials for industrial uses. The objective of the present work was to perform comparative study between native starch and modified starch depending upon their morphological, functional and rheological properties. One part of starch was modified by ultrasonication, the other part was the counterpart and termed as native starch. The key findings was proximate composition analysis revealed a decrease in moisture content from 12.5% for native starch to 9.9% after 20 minutes of sonication, whereas ash, protein, and lipid contents slightly increased, possibly due to the structural changes in the starch matrix, morphological analysis showed an increase in surface roughness, which in turn provides greater potential for enzymatic interactions and functional properties of the starches ranges from (75 to 90±1.12%)water absorption capacity, (0.26% to 0.85%) Bulk density,(0.84% to 2.49%) oil absorption capacity, (6.12% to 8.61%)swelling capacity and (6.34±0.05 to 6.56±0.02%) ph. Significant differences were observed from the functional properties of the starches due to modification. These results indicate that sonicated TSS is a robust and environmentally friendly biopolymer with potential uses in the food science and pharmaceutical industry and other industries where new material solutions are required.

Keywords: tamarind seed, Starch modification, functional properties

Utilisation Of Jackfruit Seed in The Development of Vegan Muffins.

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ABSTRACT

People are moving today's the vegan diet which is free from any animal dietary source and there is evaluation of so many vegan food products in this area. One of the most underutilised seeds which is discarded is Jackfruit seed flour and milk that are the potential source of nutrient. Jackfruit seeds milk are very low in fats, high in protein and rich in micronutrients. The study was conducted to do the proximate and nutritional analysis of jackfruit seed milk and flour based muffins and utilisation of plant based milk for the production of bakery products . Seed flour and milk was utilised to make muffins. Muffins was prepared with 30% jackfruit seed flour and 70% of other flour, jackfruit milk, banana and dry fruits. The reason behind not using only jackfruit seed flour is there bitter taste and dark colour Proximate analysis showed that muffins contains moisture (), crude fibre(),fat()and ash(). Research reveals that jackfruit seed presents higher fat absorption capacity (72%) than water absorption capacity (86%), dispersibility (33%), soulability (2.31). Jackfruit seeds a potential source for the development of vegan products. The more replacement of jackfruit seed effect the protein and carbohydrates content of the muffins. The waste which has a nutritional importance need to be used to reduce the food waste in making nutritious product and this promote sustainable food products.

Keywords: jackfruit, vegan muffins, underutilised food, nutritional status

Development And Optimization of a Novel Synbiotics Maize Based Spread: Response Surface Methodology Approach

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ABSTRACT

Synbiotics have become more and more popular in recent years due to customer demand for natural, evidence-based methods of maintaining and preventing illness. Synbiotics is the combination of the probiotics and prebiotics. In the current study attempt has made to formulate a maize flavoured yogurt spread. Maize is rich in fibre content, specifically in the form of soluble fibre (inulin), which promotes prebiotic properties. The formulation process involved the incorporation of probiotic yogurt into a base composed of maize flour and seed mix powder. Response surface methodology was used to optimize formulations of maize flavoured yogurt spread. Twenty-nine formulations with varying levels of independent variables, viz., yogurt (55-65%), maize flour (25-35%), seed mix (4-6%) and herb mix (4-6%) were processed using Box-Behnken Design (BBD). The dependent variables were moisture content, pH, total bacterial count (TBC) and overall acceptability. The optimized synbiotics spread attained a good range of total bacterial count 2.2×10^{8}CFU/mL, protein 9.01%, fat 8.07%, DPPH antioxidants potential 60.58% and total phenolic content 73.39%. Moisture content (17.19%) and acid value (0.32%) complies with the FSSAI guidelines for the fat spreads. Also, as it is made with natural ingredients without any addition of the artificial additives or sweeteners. Thus, this shows that synbiotics spread has the potential for industrial exploitation as a promising functional food product.

Keywords: synbiotics, probiotic, prebiotic, inulin, FSSAI

Redefining Traditional Indian Dairy Products Through Innovation: 3D Printing for Digitizing *Burfi* Production

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ABSTRACT

This study envisaged the possibility of the application of 3D printing to digitize the *burfi* production process. The 3D printing formulations of *burfi* were prepared with varying total solids (TS) (55 and 60%) of *khoa* and sugar concentrations (15, 20, 25 and 30%). Rheological analyses of printing formulations *viz*., shear-stress behavior, apparent viscosity (η), yield stress (τ_0), and storage modulus (G′) along with printability assessment of 3D constructs were conducted to optimize the printing formulation. The rheological analysis revealed that increasing sugar content, coupled with reduced milk solids, led to elevated viscosity and a decline in storage modulus, ultimately causing sagging in the printed constructs. By correlating rheological attributes with 3D printability assessment, it was evident that higher storage modulus, flow consistency index and yield stress of the formulations resulted in 3D constructs with the highest dimensional stability and shape retention post-printing. In assessing the quality of the 3D printed constructs, the formulation containing *khoa* 60% solids and added sugar at 20% level obtained the highest visual assessment score (8.9), with extrusion rate of 0.62g/ min, dimension accuracy factor of 97.5% and yield stress value of 438.64 Pa. The results provided an insight about the application of 3D printing for *burfi* production process thus, result may help to automize and digitize the *burfi* production process.

Keywords: 3D printing, *burfi*, khoa, rheology, sugar

Texture Modified Protein Extrudates Prepared by Reactive Supercritical Fluid Extrusion

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ABSTRACT

Utilization of supercritical fluid extrusion (SCFX) to alter the microstructure of biopolymers offers new opportunities to design novel products of enhanced utility. In this project, SCFX was utilized to modify the microstructure of milk protein concentrate (MPC) extrudates to develop quick, in-mouth disintegrating products. The reactive role of SC-CO_2 in altering the physicochemical properties of MPC-sucrose (MPC-S) extrudates was evaluated by comparing the effects of steam extrusion (SX) at 115 °C and SCFX at 85 °C. SC-CO_2 injection at 2.5 (SC-2.5) and 5 (SC-5) wt. % of feed moisture, temporarily lowered the pH of the melt to 4.90 and 4.75, respectively while pH 6.2 was maintained during SX. Compared to unextruded samples, free sulfhydryl content was reduced by 12.6% in SC-5 and 75.9% in SX extrudates indicating decreased sulfhydryl interactions in SCFX extrudates. The temporarily induced acidity and lower operating temperature of SCFX was found to prevent protein aggregation during extrusion. To further prevent the protein-protein interactions during SCFX and to induce ionic destabilization in the extruded milk proteins, sodium hexametaphosphate (SHMP) as a functional ingredient was utilized. Reduction of protein interactions contributed to the weakening of the scaffolding that make the expanded structure of the extrudate resulting in extrudates with quick in-mouth dissolution characteristics. In-mouth dissolving properties of MPC-S puffs with an optimized level of SHMP addition (0.4%) were found to be comparable to the commercial starch-based baby puffs by the sensory panel.

Keywords: Milk protein concentrate, Supercritical fluid extrusion, In-mouth dissolution, Texture modified foods

The Iron Boost: A nutritional snack with *Lepidium sativum* and *Oryza sativa*.

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ABSTRACT

Anaemia occurs when tissues cannot maintain a normal haemoglobin concentration, *Lepidium sativum* is rich in protein, fatty acid, vitamin, minerals, and various bioactive compounds. Combined with rice flakes flour, jaggery and dry fruits they serve as an excellent iron source. Studies have shown that consuming these ingredients improves haemoglobin levels in anaemic population. This study aims to develop and standardize snacks using these ingredients and to assess the sensory characteristics. The study was conducted to develop a product from garden cress seeds and rice flake flour, jaggery and dry fruits. Garden cress seeds and rice flakes were dry roasted and churned into a fine powder and combined into a dough using remaining ingredients. Sticks were made with the help of a sev making machine and baked in the oven. Formulation of sticks and the optimization of the product based on sensory properties. For sensory evaluation, the product was used in different variations. In T1- garden cress seeds (2og), rice flour (50g), jaggery (20g), almonds (2.5g), raisins (2.5g). In T2, garden cress seeds (25g), rice flour (50g), jaggery (20g), almonds (2.5g), raisins (2.5g), respectively. The sensory evaluation was done by using a 9-point hedonic scale. The study revealed that T2 was the most acceptable product in various parameters. The nutritional composition of a sample of 100g was (energy-423 kcal, carbohydrates-31.12g, protein-31.64g, fat-7.677, fiber-4.36g, moisture-10.44g, iron-7.4mg and ash content-2.6g). This study concluded that sample T2 can be used for anaemic population. It enhances haemoglobin levels and combats anaemia. It improves bioavailability, aids in public health initiatives, and offers sustainable, natural alternatives to synthetic supplements.

Keywords: Anaemia, *Oryza sativa, Lepidium sativum*

Enhancing The Stability of Beetroot Betalain Through Acidulants and Copigmentation

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ABSTRACT

Beetroot (*Beta vulgaris* L.) is one of the most important industrial crops, cultivated primarily for its rich natural colorant, betalain, and exceptionally high antioxidant activity. As the most economical source of water soluble betalain (biocolourant, E162), it is approved under EU. Betalain, a combination of betacyanin and betaxanthin, are responsible for the purple-red colour in beetroot. These pigments not only enhance the visual appearance of food matrices but also offer significant health benefits due to their potent antioxidant, anti-inflammatory, and potential anticancer properties. Despite several advantages, betalain are prone to degradation when exposed to harsh environmental factors such as heat, light, pH variations, and oxygen, and thus limiting its application. Therefore, strategies to enhance its stability, through acidulant, copigmentation, complex formation and encapsulation, are suggested to be explored to improve their commercial viability. Since horticultural produces are rich in organic acids that can be utilised in stability enhancement of native betalain therefore, various commonly found acidulants, such as ascorbic, citric, malic, tartaric, and succinic acids at 0.25%, 0.50%, 0.75%, 1.00%, 1.50%, and 2.00% (w/v) level was used to enhance the betalain stability. Performance of ascorbic acid at 1% (w/v) level was found best in terms of minimum betalain degradation (46.40%), followed by citric acid, tartaric acid, succinic acid and malic acid after 6 days of storage. Further, BCA (black carrot anthocyanin) was tried as copigment with betalain under acidic environment created by malic acid. Lower percentage degradation of copigment betalain (26.93%) in comparison with native betalain (96.43%) and two times higher half-life (t1/2) confirmed stability of the pigment in malic acid rich environment.

Keywords: betalain; acidulants; malic acid; co-pigmentation; black carrot anthocyanins

Effect Of Micro-Nanobubbles on The Fermentation Pattern and Physicochemical Attributes Of Stirred Yoghurt

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ABSTRACT

Micro-Nanobubbles (MNBs) have attracted great attention these days, offering a wide range of applications across various disciplines due to their unique properties. Fermentation is an age-old practice carried forward for the preservation of milk and milk products, stirred yoghurt being one such product. Through the present study, it was attempted to understand the effect of incorporation of micro-nanobubbles on the fermentation pattern of Yoghurt Strater Culture (YSC) i.e., *Streptococcus thermophilus* and *Lactobacillus bulgaricus,* and quality attributes of stirred yogurt thus prepared. Different types of MNBs were prepared using different gases, compressed purified air, CO_2, O_2, and N_2 in water and milk systems using a bulk nanobubble generator. Average bubble concentration was found to be in the range of $\sim 10^7$ mL^{-1} while mean size was found to be 176.0 ± 3.5nm to 217.6 ± 6.9nm. It was observed that the types of MNBs had a significant effect on the metabolism and microbial growth of the starter culture. Among the four different types of MNBs, CO_2-MNBs had a significantly positive effect on bacterial cell mass growth besides increasing the viability in fermented milk. Our findings suggest that MNBs in general and CO_2-MNB in specific has the potential for their applications in altering the fermentation pattern in fermented dairy products. Further, concerning the quality attributes of MNBs incorporated stirred yoghurt, notable changes were observed in terms of viscosity, mouthfeel, and shelf life. A significant increase in viscosity of the MNBs incorporated stirred yoghurt was observed as compared to control sample which may be attributed to milk protein-polysaccharide interaction at the interface of MNBs. It is, therefore concluded that MNB technology has the potential to be applied as a new processing tool to easily tweak the fermentation pattern and physicochemical properties of fermented dairy products to meet the increasing consumer demand for innovative products with variable consistency and functionality.

Keywords: Micro-Nanobubbles, fermentation, stirred yoghurt, physicochemical properties

Formulation And Process Optimization and Formulation of Apricot-Based Water Kefir Fermented Drink

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ABSTRACT

Water kefir is a probiotic-rich fermented beverage made by fermenting a sweetened liquid with water kefir grains, which contain beneficial lactic acid bacteria (LAB), acetic acid bacteria (AAB), and yeast. It improves gut health, immunity, and digestion due to its high probiotic density. Apricot fruit contains vitamins A, C, and E, fiber, and antioxidants that promote skin health, digestion, and heart function. Apricot-based water kefir is a functional drink that provides probiotics as well as vital nutrients, hence preserving gut flora and health. The combination is a healthier, more refreshing, and natural alternative to standard probiotic drinks. The aim of this study is to optimize apricot-based water kefir fermented drink (AWKD) through response surface methodology (RSM) by Box-Behnken design (BBD). Apricot juice was fermented with water kefir grains at 32°C for 24 hours with varying concentrations of water kefir grains (4.6%–10% w/v), apricot juice (16.6%–23.3% w/v), and brown sugar (4%–6% w/v). The impact of the variables on pH, total bacterial load (CFU/mL), and overall acceptability (9-point hedonic scale) was investigated to identify the optimal product formula. Nutritional and physicochemical analysis of the optimized AWKD was conducted using AOAC international methods. The optimal combination was 8% water kefir grains, 8% brown sugar, and 20% apricot juice with a product having pH 3.86, total bacterial load of 2.79 × 108 CFU/mL, and an overall acceptability value of 6.89. This result indicated its potential as a functional probiotic beverage with enhanced microbial viability and sensory acceptability. It can be a good alternative of vegan probiotic beverages or for lactose intolerants

Keywords: Antioxidants, Probiotics, Fermentation, Physicochemical analysis

Functional Plant-Based Paneer: A Nutrient-Rich Innovation

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ABSTRACT

The rise in vegetarianism, veganism, and plant-based diets is driven by health, environmental, and ethical concerns, with plant-based alternatives aiding lactose intolerance, dairy allergies, and calorie management. Paneer, rich in protein and essential vitamins, is a key option, and Cowpea *(Vigna Unguiculata),* a nutrient-dense legume, is being explored as a paneer base. This study aimed to develop Cowpea paneer infused with herbs and spices and assess its sensory characteristics and nutritional composition. Cowpea (200g) were soaked, blended with water (500ml), and sieved for milk extraction, followed by boiling with herbs/spices: T1 – Garlic (4%), T2 – Cumin (4%), and T3 – Curry Leaves (4%). Coagulation, sieving, pressing, and shaping into tofu followed. Sensory evaluation using a 9-point hedonic scale showed T1 (Garlic) as the most acceptable, scoring highest in appearance (8.24), aroma (8.14), taste (8.18), texture (8.30), and overall acceptability (8.40), while T2 (Cumin) had moderate acceptance (7.38), and T3 (Curry Leaves) scored lower. The nutritional composition of 100g T1 included energy (140.49 kcal), carbohydrate (12.8g), protein (12g), fat (4.1g), fibre (6.90g), moisture (3.47g), and ash (1.48g). The study concluded that Cowpea paneer with garlic is protein-rich and beneficial for vegans, lactose-intolerant individuals, and those managing calories. This nutrient-dense, flavourful paneer supports veganism, sustainability, and public health by providing a healthy protein alternative.

Keywords: Plant based, Vegan, *Vigna Unguiculata*, *Allium sativum*, Sustainability

Development Of Black Rice Muffins Incorporated with Banana Flour

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ABSTRACT

Black rice (*Oryza sativa L.)* is the staple food in several countries especially in Asian. The black rice bran fraction contains high levels of fibre and bioactive photochemical including tocopherols, tocotrienols, oryzanols, dietary fibres, vitamins and phenolic compounds, which are beneficial to human health and well being. In the present investigation attempts have been made to develop Black rice muffins by the supplementation of banana flour. Unripe banana flour (UBF), which is rich in resistant starch (RS), have shown the several positive physiological effects in clinical trials. Although such observations encourage the emergence of UBF in the food market, specific identity or quality standards for the product are still lacking. Muffins were prepared with rice bran flour and banana flour by different ratio of black rice (100%) control, (90:10), (80:20) and (70:30) respectively. The black rice was produced by grinding black rice and then mixing with banana flour. The mixing is poured into mini bakery cup and baked at 180 degree. Highest moisture and protein were found in BRF: BF (70:30) i.e. 24.61% and 10.27% respectively. Highest fat and ash were found in BFR: BF (80-20) i.e. 14.92% and 2.69% respectively. Highest carbohydrate was found in control black rice flour (100%) and highest energy was found in BRF: BF (90:10). Most acceptable sensory score were color and appearance BRF: BF i.e. 7.63%, texture with BRF: BF (70:30) i.e. 7.35%. The muffins were evaluated by nutritional composition and organoleptic evaluation. These muffins are being most preferred by consumers.

Keywords: Black rice, *Oryza sativa L.,* Black rice flour, banana flour, nutritional composition.

Formulation And Process Optimization and Formulation Of Apricot-Based Water Kefir Fermented Drink

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ABSTRACT

Water kefir is a probiotic-rich fermented beverage made by fermenting a sweetened liquid with water kefir grains, which contain beneficial lactic acid bacteria (LAB), acetic acid bacteria (AAB), and yeast. It improves gut health, immunity, and digestion due to its high probiotic density. Apricot fruit contains vitamins A, C, and E, fiber, and antioxidants that promote skin health, digestion, and heart function. Apricot-based water kefir is a functional drink that provides probiotics as well as vital nutrients, hence preserving gut flora and health. The combination is a healthier, more refreshing, and natural alternative to standard probiotic drinks. The aim of this study is to optimize apricot-based water kefir fermented drink (AWKD) through response surface methodology (RSM) by Box-Behnken design (BBD). Apricot juice was fermented with water kefir grains at 32°C for 24 hours with varying concentrations of water kefir grains (4.6%–10% w/v), apricot juice (16.6%–23.3% w/v), and brown sugar (4%–6% w/v). The impact of the variables on pH, total bacterial load (CFU/mL), and overall acceptability (9-point hedonic scale) was investigated to identify the optimal product formula. Nutritional and physicochemical analysis of the optimized AWKD was conducted using AOAC international methods. The optimal combination was 8% water kefir grains, 8% brown sugar, and 20% apricot juice with a product having pH 3.86, total bacterial load of 2.79 × 108 CFU/mL, and an overall acceptability value of 6.89. This result indicated its potential as a functional probiotic beverage with enhanced microbial viability and sensory acceptability. It can be a good alternative of vegan probiotic beverages or for lactose intolerants.

Keywords: Antioxidants, Probiotics, Fermentation, Physicochemical analysis.

Studies In Antioxidant Properties and Cytotoxicity Of Dehydrated Red Peels Of Dragon Fruit As Food Colour In White Dragon Fruit Juice

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ABSTRACT

Hylocereus Undatus, commonly called dragon fruit, is gaining importance due to its nutritional benefits. However, the peels of this fruit have much higher antioxidants than juice. This paper reports red peel extract powder (spray dried) as a food colorant to improve the nutritional attributes of dragon fruit juice. Spray-dried powder of aqueous peel extract (antioxidant 38.40 mg GAEAC/100g) was obtained and studied for antioxidant and toxicity. This peel extract powder (PEP) was incorporated up to 0.8% in dragon fruit juice, which showed a marked enhancement in antioxidant value from 16.71±0.27 mg GAEAC/100 g to 47.14 ± 0.3 mg GAEAC/100 g. The toxicity study of the peel extract powder on human adenocarcinoma colon cell line HT-29 (ATCC-HTB-38) showed that a 0.8% addition of the peel extract powder is safe. XRD and FTIR analysis was carried out to study structure. A process flow sheet with a material balance is also proposed for small-scale industries processing dragon fruit with the utilization of red peels as food colorant.

Keywords: Dragon fruit peels, toxicity, antioxidant, color, spray dryer

Monk Fruit: The Future of Natural Sweeteners for Global Health, Sustainable Agriculture, and Diabetes Prevention

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ABSTRACT

Monk fruit (*Siraitia grosvenorii*) is gaining recognition as a natural, zero-calorie sweetener with significant health and environmental benefits. Unlike sugar and artificial sweeteners, it contains mogrosides, which provide sweetness without raising blood sugar levels, making it a promising option for diabetes prevention. This study explores monk fruit's nutritional advantages, sustainability, and potential impact on the food industry. A detailed literature review was conducted using PubMed, ScienceDirect, and Google Scholar to analyze its antioxidant, anti-inflammatory, and metabolic benefits. Additionally, a sensory evaluation was performed by incorporating monk fruit into sweets to assess taste, texture, and overall consumer acceptance. Findings confirm that monk fruit is a highly acceptable sugar alternative that supports both health and sustainability. Its cultivation requires fewer resources than sugarcane, making it an environmentally friendly choice. As demand for natural and functional ingredients grows, monk fruit stands out as a key solution for reducing sugar consumption and promoting global health.

Keywords: diabetes prevention, functional foods, metabolic health, monk fruit, sustainability

Enhancing Food Ordering Accessibility: Real-Time Sign Language Translation with Generative AI

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ABSTRACT

Real-time sign language translation systems utilize computer vision (CV), natural language processing (NLP), and generative AI to bridge communication gaps between sign language users and non-users, particularly in food ordering scenarios. By leveraging pose estimation and gesture recognition, these systems accurately interpret hand, face, and body movements relevant to dining experiences. An AI model processes this data, translating individual signs into contextually appropriate responses about menu items, dietary preferences, and order specifics. The refined output is converted into natural-sounding speech with tone and emotion, facilitating seamless communication between customers and restaurant staff. This AI-driven approach significantly enhances accessibility for mute and speech-impaired individuals, allowing for real-time translation during food ordering, inquiries about menu options, and interactions with service personnel. Unlike traditional methods, this system integrates context-aware generative AI to provide more fluid and meaningful interactions, specifically tailored for the dining environment. This study assesses the system's effectiveness in improving communication for speech-impaired individuals within restaurants, aiming to create a more natural and inclusive dining experience.

Keywords: Computer vision, Generative AI, Inclusivity, Real-time translation, Speech synthesis.

Dehydrated Green Chickpea Chutney

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ABSTRACT

The development and analysis of a novel dehydrated green chickpea chutney are examined in this abstract. Preserving the nutrients and flavours of fresh chutney while improving its shelf life and ease was the main goal. A potential addition to contemporary cooking techniques, dehydrated chutney satisfies the needs of the fast-paced world we live in today. The main component was green chickpea, which is frequently underutilized despite having a high protein content and several health advantages. Cilantro, garlic, green chillies, and salt were added to the chutney to enhance its flavour and nutritional value. An extensive sensory evaluation was conducted, where multiple evaluators assessed the chutney's acceptability. The feedback was overwhelmingly positive, indicating that the dehydrated chutney was well-received. Additionally, various tests were performed on the samples to ensure quality and consistency. Overall, the study was effective in showcasing the potential of dehydrated green chickpea chutney as a long-lasting, wholesome, and convenient food item that is perfect for modern lifestyles. In addition to showcasing the adaptability of green chickpeas, this innovation creates new opportunities for underutilized legumes in the food business.

Keywords: Dehydrated, Chutney, Green Chickpea, Sensory Evaluation, Evaluators, Product Development

3D Food Printing: A Technological Revolution in Food Manufacturing and Customization

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ABSTRACT

3D food printing is an innovative technology that combines additive manufacturing with food science to produce customized and complex edible structures. This process utilizes techniques such as extrusion-based printing, binder jetting, inkjet printing, and laser sintering. The success of 3D-printed food depends on key factors like material viscosity, rheology, and gelation properties, which influence the stability and accuracy of the final product. Computational methods, including finite element analysis (FEA) and computational fluid dynamics (CFD), are used to optimize extrusion mechanics and layer adhesion. This technology has a wide range of applications, including personalized nutrition, medical dietary solutions, and sustainable food production through alternative protein sources. It plays a crucial role in developing specialized food textures for individuals with swallowing disorders and holds potential for producing customized meals in space missions. Despite its advantages, challenges such as slow production speed, post-processing requirements, food safety regulations, and consumer acceptance must be addressed for broader adoption. Advancements in multi-material printing, artificial intelligence integration, and lab-grown meat bio-printing are expected to enhance the capabilities of 3D food printing. As research progresses, this technology could transform the food industry by offering greater efficiency, personalization, and sustainability.

Keywords: 3D food printing, additive manufacturing, extrusion technology, Personalized Nutrition, computational modelling, food sustainability.

Extraction and Modification of Plant Based Proteins

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ABSTRACT

Plant-derived proteins are receiving increasing recognition for their application in the food industry as alternatives to animal proteins owing to their sustainability and nutritional benefits. However, their viscous and emulsifying character needs improvement for wider acceptance in the food industry. This research deals with the extraction and modification of plant proteins from legumes, cereals and oilseeds. Several methods of protein extraction including alkaline, enzymatic, and ultrasound assistance were researched to achieve the best yield with the highest possible protein concentration. Also, chemical and enzymatic and physical modifications were made to improve the functional properties. The impact of these changes on protein structure, biodegradability, and techno-functional properties was assessed using spectroscopy and rheology. The results emphasize the promise of extractions and modifications that were designed to maximize the yield and functionality of plant protein to be employed in food products for the enhancing the quality of plant protein products.

Keywords: Extraction, Modification, Plant based Proteins

Intelligent Packaging: Innovations, Applications, and Future Prospects

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ABSTRACT

Intelligent packaging is transforming the packaging industry by integrating advanced technologies such as sensors, RFID, NFC, and IoT to enhance product safety, quality, and traceability. Unlike traditional packaging, intelligent packaging provides real-time monitoring of environmental conditions like temperature, humidity, and gas levels, ensuring optimal storage and reducing spoilage. This technology is particularly beneficial in industries such as food, pharmaceuticals, and logistics, where maintaining product integrity is crucial. Intelligent packaging falls into three categories: active packaging, which interacts with the product to extend shelf life; smart packaging, which provides real-time data on product status; and connected packaging, which facilitates digital communication between consumers and supply chain stakeholders. These innovations help improve inventory management, prevent counterfeiting, and enhance consumer engagement through interactive elements like QR codes and blockchain-enabled traceability. While intelligent packaging offers numerous benefits, challenges such as high implementation costs, technological limitations, and regulatory compliance must be addressed for widespread adoption. However, as sustainability and consumer demand for transparency increase, the development of cost-effective and eco-friendly intelligent packaging solutions is gaining traction. This paper explores the latest advancements, applications, and challenges in intelligent packaging, highlighting its potential to improve supply chain efficiency, reduce food and medical waste, and enhance user experience. As digital transformation continues, intelligent packaging is set to play a pivotal role in the future of sustainable and smart packaging solutions.

Keywords: Intelligent packaging, smart packaging, active packaging, connected packaging, RFID, NFC, IoT, sensors

Reducing Food Waste: Cold Storage Solutions for Fruits and Vegetables.

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ABSTRACT

Food waste is a major global concern, with fruits and vegetables being particularly vulnerable due to their perishable nature. Cold storage solutions have proven to be one of the most effective methods for extending the shelf life of fresh produce, thereby reducing food waste across the supply chain. This explores how advanced cold storage techniques help preserve the quality and freshness of fruits and vegetables from farm to table, minimizing spoilage and waste at various stages of the supply chain. Cold storage technologies such as temperature-controlled environments, refrigeration, and Modified Atmosphere Packaging (MAP) slow down the ripening process, reduce microbial growth, and maintain optimal moisture levels, thus prolonging the shelf life of perishable products. Additionally, the integration of smart cold storage systems, including IoT-enabled sensors and real-time monitoring, optimizes storage conditions and ensures minimal energy consumption. Additionally, the environmental and economic benefits of cold storage, including reduced food waste, lower carbon footprints, and energy-efficient practices. Furthermore, cold storage helps reduce the reliance on seasonality, allowing for year-round availability of fresh produce, reducing supply chain vulnerabilities, and improving food security in both developed and developing regions. The finding of this study highlight, efficient cold storage solutions are a critical component in reducing food waste, promoting sustainability, and enhancing the overall efficiency of the global food supply chain. These solutions not only benefit the environment but also help in providing more reliable access to nutritious food for consumers worldwide.

Keywords: Cold Storage, Food Waste Reduction, Fruits and Vegetables, Shelf-Life Extension Sustainable Practices.

Pomegranate Peel and Seed Valorization

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ABSTRACT

Pomegranate (Punica granatum) processing generates a significant amount of byproducts, particularly peels and seeds, which hold immense potential for value-added applications. The peel is rich in polyphenols, flavonoids, and tannins, exhibiting strong antioxidant, antimicrobial, and anti-inflammatory properties. These bioactive compounds make pomegranate peel a valuable ingredient in functional foods, nutraceuticals, and cosmetics. Similarly, pomegranate seeds contain high-quality oil with punicic acid, known for its anti-inflammatory and cardioprotective benefits. Various sustainable extraction techniques, including supercritical CO_2 and ultrasound-assisted extraction, enhance the recovery of these bioactives while minimizing environmental impact. Additionally, peel and seed-derived compounds are increasingly explored in biodegradable packaging, pharmaceuticals, and animal feed, promoting a circular economy. Despite their high potential, challenges remain in standardizing extraction methods and ensuring product stability. Further research and technological advancements can optimize the utilization of pomegranate byproducts, reducing waste and fostering sustainability in the food and health industries. This review highlights recent progress in pomegranate peel and seed valorization, emphasizing their functional applications and prospects.

Keywords: Pomegranate byproducts, peel extract, seed oil, bioactive compounds, antioxidant, nutraceuticals, sustainable extraction, circular economy, food applications, waste valorization.

Vacuum Dehydration Technology for Ginger Candy

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ABSTRACT

Vacuum dehydration (VD) technology has been received much attention as an effective drying method to obtain high-quality ginger candy, which can retain its bioactive compounds, enhance sensory properties, and prolong shelf life. This process occurs at lower temperatures compared to more commonly used methods of drying, since the process happens under reduced pressure, which not only preserves more volatile compounds, but also avoids thermal degradation, creating products with better quality in terms of texture and flavour. This review discusses the basic principles of vacuum dehydration, soft network mechanism, and advantages of vacuum dehydration compared to other drying methods (such as hot air drying, freeze-drying). Key included process parameters like temperature, pressure, drying time and level of vacuum that affects moisture content, colour, aroma and nutritional properties of ginger candy are discussed. Process efficiency can further be improved by novel hybrid drying methods, which include vacuum-assisted osmotic dehydration and vacuum freeze-drying. The review also notes oppositional issues including energy-intensive approaches, high equipment cost, and limited scalability for industrial applications. Proposed future research directions include optimizing process conditions, integrating energy-efficient technologies, and developing sustainable solutions for large-scale production. This study could offer specific guidelines for the researcher and food manufacture to focus on ginger candy in vacuum dehydration technology.

Keywords: Vacuum dehydration, ginger candy, low-temperature drying, volatile retention, hybrid drying techniques.

Advancements in Plant Protein Modification through Cold Plasma Treatment

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ABSTRACT

Cold plasma (CP) technology has emerged as a non-thermal, sustainable method for enhancing the functional properties of plant proteins, addressing their inherent limitations in food applications. While plant proteins are valued for their environmental sustainability and nutritional benefits, their low solubility, emulsification, and film-forming abilities limit their integration into food matrices. CP offers a “green” alternative, leveraging ionized gases to induce molecular modifications without the need for solvents or chemicals, aligning with clean-label and environmentally friendly processing demands.This review explores the impact of CP on plant proteins, focusing on its ability to improve solubility, emulsifying capacity, gelation, and barrier properties. Reactive oxygen and nitrogen species generated during CP treatments induce structural changes at primary to quaternary levels, enhancing functional performance while reducing allergenicity. CP also enables enzyme inactivation, immobilization, and the fabrication of protein nanoparticles and protein-based films with improved mechanical strength and reduced permeability. Despite these advantages, CP technology faces challenges, including potential nutritional losses, reduced thermal stability, and scalability for industrial applications. Prolonged or high-voltage treatments may compromise protein functionality, necessitating precise optimization of parameters such as gas composition, power source, and exposure duration. With its energy efficiency, minimal environmental footprint, and compatibility with sustainable production goals, CP technology holds significant promise for revolutionizing the food industry. By addressing current challenges, CP can enhance the functionality of plant proteins and contribute to food security, sustainable production, and the development of innovative food products.

Keywords*:* Plasma (CP), Plant Proteins, Non-Thermal Processing, Protein Functionalization, Solubility Enhancement.

Expansion in Dairy Fermentation Technology

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ABSTRACT

The expansion of dairy fermentation technology has revolutionized the industry, enhancing product quality, safety and sustainability. Advances in microbial strain development, precision fermentation, and bioprocess optimization have led to improved texture, flavor, and nutritional value in dairy products. Innovations such as Probiotic- enriched formulations, alternative fermentation substrates and automation-driven production processes have broadened market opportunities. Additionally, the integration of biotechnology and digital monitoring systems has increased efficiency and consistency in large scale dairy fermentation. The ongoing evolution is shaping the future of dairy processing, meeting consumer demands for healthier and more diverse fermented dairy products.

Keyword: Dairy fermentation, Microbial strain development, Probiotics, Biotechnology, Sustainable dairy processing

FTIR Spectroscopic Characterization of Dehulled Horse gram and Its Protein Hydrolysates: Implications for Functional Properties

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ABSTRACT

Fourier Transform Infrared (FTIR) spectroscopy serves as a valuable tool for understanding the structural and functional attributes of proteins. This study utilizes FTIR spectroscopy to examine the molecular structure of dehulled horsegram (*Macrotyloma uniflorum*) and its protein hydrolysates, with a focus on their functional implications. The analysis highlights key absorption bands, particularly in the amide I (1600–1700 cm^{-1}) and amide II (1500–1600 cm^{-1}) regions, which correspond to distinct protein secondary structures such as α-helices and β-sheets. Notably, enzymatic hydrolysis leads to shifts in these bands, suggesting modifications in protein conformation and increased exposure of hydrophilic groups. The study further explores how these structural changes influence functional properties like solubility, emulsification, and foaming capacity. Enhanced hydrogen bonding, reflected in increased band intensities within the 3200–3400 cm^{-1} region, corresponds to improved solubility. Similarly, alterations in hydrophobic interactions appear to affect emulsification and foam stability. These findings reinforce the role of FTIR spectroscopy in tracking protein modifications and their functional consequences. By providing insight into the structural transformations of horse gram protein hydrolysates, this research underscores their potential application in food formulations. The results contribute to the growing interest in plant-based proteins, particularly from underutilized pulses, as sustainable alternatives in food systems.

Keywords: FTIR spectroscopy, horse gram protein hydrolysates, structural changes, functional properties, enzymatic hydrolysis

Date Seed Coffee – A Functional and Caffeine-Free Alternative to Traditional Coffee

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ABSTRACT

Caffeine ($C_8H_{10}N_4O_2$), acrylamide (C_3H_5NO), chlorogenic acids ($C_{16}H_{18}O_9$), and diterpenes (cafestol and kahweol) are bioactive substances found in traditional coffee that have been linked to raised LDL cholesterol, neurotoxicity, increased heart rate, and stomach discomfort. Because it may cause cancer, acrylamide, a result of the Maillard process, is especially dangerous. Caffeine overuse can cause anxiety, insomnia, and cardiovascular problems, therefore it's important to look for safer, caffeine-free substitutes. Without the adverse consequences of regular coffee, date seed coffee offers a high supply of dietary fiber, phenolic components (ferulic acid, gallic acid, flavonoids), and vital minerals. It is an useful and convenient alternative. Date seeds phenolic profile offers neuroprotective, anti-inflammatory, and antioxidant qualities that help lower oxidative stress and enhance metabolic health. It is also beneficial to the heart and gut due to the lack of diterpenes and caffeine, making it appropriate for people who are sensitive to stimulants. While preserving a low acrylamide level, controlled roasting intensifies Maillard-derived fragrance molecules that resemble nutty and caramelised aromas. Reusing date seeds promotes a circular economy, lowers agricultural waste, and is consistent with sustainable food ideas. According to the research, date seed coffee is a viable substitute in the functional beverage sector since it provides both health advantages and sensory pleasure. Its commercialization may be improved by additional research on bioavailability, health effects, and market acceptance.

Keywords: Caffeine, Date seed, Phenolic components, Sustainable food

Fungi-Based Mycelium Scaffolds for Plant-Based Meat Texture Optimization

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ABSTRACT

Mycelium, the root-like structure of fungi, is emerging as a revolutionary material for enhancing the texture and mouth feel of plant-based meat alternatives. This paper explores how mycelium scaffolds can mimic the fibrous structure of animal tissues, providing plant proteins with a more realistic, meat-like texture. By growing fungi in controlled environments, researchers can create natural, sustainable scaffolds that improve the juiciness, elasticity, and chewiness of plant-based products without synthetic additives. The study investigates the biocompatibility of various fungal strains, growth conditions, and their interactions with plant proteins like pea and soy. It also discusses scalability challenges and potential for commercialization. Integrating mycelium into alternative protein production offers a sustainable, clean-label solution to enhance sensory appeal, bridging the gap between traditional meat and plant-based innovations — making sustainable eating more attractive and accessible.

***Keywords**:* Plant based meat alternatives, Texture optimization, Fungi based materials, Mycelium scaffolds

Self – Healing Biopolymer Coatings for Extended Shelf Life of Fresh Produce

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ABSTRACT

Fresh produce spoilage remains a major challenge in the global food supply chain, contributing to significant food waste. This paper introduces the concept of self-healing biopolymer coatings infused with microcapsules of natural antimicrobials. When the coating is damaged, the microcapsules rupture, releasing active compounds like essential oils or antimicrobial peptides to inhibit microbial growth and prevent decay. Made from edible, biodegradable materials such as chitosan and alginate, these coatings create a dynamic, protective layer that adapts to physical damage during transport or handling. The study explores the coating's mechanical properties, release kinetics, and impact on produce freshness. This innovation not only extends shelf life but also reduces reliance on synthetic preservatives and plastic packaging, aligning with the demand for sustainable, clean-label food preservation methods. Self-healing biopolymer technology could revolutionize post-harvest management, making fresh fruits and vegetables more resilient and reducing global food waste.

Keywords: Fresh produce preservation, Self-healing biopolymer coatings, Biodegradable packaging

The Role of Technology in Scaling Mondelez's Manufacturing Excellence

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ABSTRACT

Mondelez International, a global leader in snacks and confectionery, leverages cutting-edge technology to enhance and scale its manufacturing capabilities. This study explores how smart manufacturing, data-driven insights, and automation contribute to operational efficiency, product quality, and sustainable practices. Key technological advancements, such as IoT-enabled production lines, predictive maintenance powered by AI, and digital twins, allow for real-time monitoring and optimization of manufacturing processes. Furthermore, advanced supply chain management systems and blockchain technology enhance traceability, ensuring product safety and ethical sourcing. Sustainability initiatives are amplified through energy management systems and precision technology that minimize waste and reduce environmental impact. Simultaneously, digital platforms for employee training and augmented reality tools empower the workforce, fostering a culture of continuous improvement and innovation. By integrating these technologies, Mondelez not only meets the growing consumer demand but also strengthens its market leadership through adaptable, efficient, and resilient manufacturing systems.

Keywords: Smart Manufacturing, Automation, IoT, Sustainability, Digital Transformation, Supply Chain Optimization

Bioengineered Bacterial Cultures for Flavor Enhancement in Low- Sugar Foods

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ABSTRACT

With rising health concerns around sugar consumption, there is an urgent need for low-sugar foods that retain strong flavour profiles. This paper explores the use of bioengineered bacterial cultures capable of producing natural flavour-enhancing compounds during fermentation. By modifying microbial pathways, researchers can amplify the production of volatile aroma compounds and taste-enhancing molecules that mask bitterness and enhance sweetness perception without adding sugar or artificial sweeteners. The study examines the metabolic engineering of lactic acid bacteria and yeast strains to produce natural sweeteners like thaumatin and fruity esters directly in food matrices. It also discusses the stability, safety, and sensory attributes of these compounds. This innovative approach has the potential to transform the health food market by enabling the creation of indulgent, flavourful products with minimal sugar content, offering a sustainable way to meet consumer demand for healthier yet tasty foods.

Keywords: Low sugar foods, Fermentation, Flavour enhancement, Bioengineered bacterial cultures

Upcycling Papaya By-Products in Tutti Frutti Manufacturing

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ABSTRACT

Globally, food waste surpasses 1.3 billion tons, necessitating innovative upcycling solutions to convert by-products into valuable ingredients. This study explores the application of upcycling in Tutti Frutti production, traditionally sourced from raw papaya. Conventionally, papaya peels, seeds, and residual pulp are discarded as waste. However, these by-products possess potential for transformation into natural antioxidants, dietary fibers, and functional ingredients, enhancing both nutritional value and economic viability. By integrating these waste components into value-added applications, this approach promotes sustainability, minimizes environmental impact, and fosters new commercial opportunities within the food industry.

Keywords: Upcycling, food waste valorization, papaya by-products, Tutti Frutti, dietary fiber, antioxidants, sustainable food production, value-added ingredients.

Characterization of Moringa Leaves (*Moringa Oleifera*) Dried Using different Drying Methods

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ABSTARCT

Moringa oleifera leaf powder is a potential functional food that can be fortified in flour to enhance the overall nutritional value of a food product. The aim of the research was to study the effect of different drying techniques on the physic-chemical properties of moringa leaf powder. In this research, moringa leaves were dried using three different drying techniques, including microwave drying (450W, 600W, 900W), tray drying (50ºC, 55ºC, 60ºC) and freeze drying (45ºC, 0.312 mb pressure) and grinded into fine powder. Results indicated that freeze dried sample was batter than microwave and tray dried samples due to its high nutritional content. Moisture, ash, fat, fiber, protein and total carbohydrate contents of moringa powder were found in the range of 5.07-6.60%, 11.6.-14.10%, 6.73-9.10%, 6.07-9.48%, 26.76-30% and 37.60-48.84%, respectively. The functional properties included bilk density (BD), tap density (TD), water holding capacity (WHC), oil holding capacity (OHC), water activity (A_{w}), swelling power and wettability were found in the range of 0.27-0.36(g/cm³), 0.44-0.52(g/cm³), 2.33-3.99(g/g), 1.50-1.99(g/g), 0.4980-0.5491, 2.90-3.40(ml/g) and 3.72-90.03(min), respectively. The DPPH radical scavenging activity, total flavonoid content (TFC), and total phenolic content (TPC) ranged from 45.35 to 58.13%, 3.15 to 15.48 mg QE/g and 10.30 to 50.16 mg GAE/g, respectively. As per the results, freeze drying is an optimum drying technique as it retains the nutrients, bioactive compounds and colour quality of moringa leaves powder. Therefore, freeze dried moringa leaf powder can be a better alternative when compared with tray and microwave drying.

Keywords: *Moringa oleifera*, nutrients, bioactive compounds, Functional properties.

Flavonoids: Potent Antioxidants in the Prevention of Free Radical Formation

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ABSTRACT

Flavonoids are phenolic substances isolated from a wide range of vascular plants, with over 8000 Individual compounds known. They act in plants as antioxidants, antimicrobials, photoreceptors, visual Attractors, feeding repellents, and for light screening. Many studies have suggested that flavonoids Exhibit biological activities, including antiallergenic, antiviral, anti-inflammatory, and vasodilating Actions. However, most interest has been devoted to the antioxidant activity of flavonoids, which is Due to their ability to reduce free radical formation and to scavenge free radicals. The capacity of Flavonoids to act as antioxidants in vitro has been the subject of several studies in the past years, and Important structure–activity relationships of the antioxidant activity have been established. The Antioxidant efficacy of flavonoids in vivo is less documented, presumably because of the limited Knowledge on their uptake in humans. Most ingested flavonoids are extensively degraded to various Phenolic acids, some of which still possess a radical-scavenging ability. Both the absorbed flavonoids and their metabolites may display an in vivo antioxidant activity, which is evidenced experimentally by the increase of the plasma antioxidant status, the sparing effect on vitamin E of erythrocyte Membranes and low-density lipoproteins, and the preservation of erythrocyte membrane polyunsaturated fatty acids.

Keywords: Flavonoids, antioxidants free radicals phenolic compounds radical scavenging.

Next-Generation Nutraceuticals: A Look into Advanced Processing and Formulation

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ABSTRACT

Nutraceuticals are bioactive compounds formulated into foods and supplements to provide health benefits beyond basic nutrition. With the rising demand for functional foods, the industry is witnessing a shift toward next-generation nutraceuticals, driven by advancements in processing technologies and formulation strategies. This study explores cutting-edge processing techniques such as microencapsulation, nanoemulsions, spray drying, high-pressure processing, and cold plasma technology to improve bioavailability, stability, and efficacy. These methods help protect sensitive bioactives, enhance absorption, and ensure product consistency. Additionally, innovative formulation approaches are playing a crucial role in nutraceutical development. Strategies like smart delivery systems, synergistic ingredient combinations, lipid-based carriers, and sustainable formulations are revolutionizing product efficacy and consumer acceptability. These advancements aim to create nutraceuticals that are not only highly bioavailable but also align with trends in clean-label products, sustainability, and personalized nutrition. The findings of this study highlight how next-generation nutraceuticals can improve nutrient absorption, deliver targeted health benefits, and enhance overall product sustainability. Moreover, future trends such as AI-driven personalized nutrition, 3D-printed nutraceuticals, and eco-friendly processing methods are expected to drive further innovation in the field. This poster provides key insights into the evolving landscape of nutraceutical manufacturing, bridging the gap between scientific advancements and industry applications for better health solutions.

Keywords: Nutraceuticals, Advanced Processing Techniques, Bioavailability Enhancement, Innovative Formulation, Personalized Nutrition

Shear Cell Technology: A Game Changer in Plant Based Meat Alternatives

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ABSTRACT

The increasing demand for plant-based meat analogues has led to innovations in food structuring technologies. Traditional methods like high-moisture extrusion effectively produce fibrous textures but struggle to replicate the layered structure of real meat cuts. Shear Cell Technology (SCT) is an emerging approach that uses controlled shear forces to align plant proteins, resulting in a more realistic, meat-like texture, with fewer additives and better mouthfeel. This process works by placing a plant protein mixture, such as soy, wheat, or pea, between two rotating plates that apply shear stress. This force stretches and aligns the proteins into fibrous layers, similar to the structure found in animal muscle. Unlike extrusion, which requires high heat and pressure, SCT works at lower temperatures, helping to preserve protein quality and natural functionality. Shear Cell Technology presents multiple advantages, including lower energy consumption, fewer additives, and the ability to create whole cuts like plant-based steak, chicken breast, and pulled pork. However, despite its great promise, scalability remains a challenge due to higher cost and difficulty in industrial adaption when compared to extrusion. Currently, research is being done with focus on optimizing SCT for commercial production. As the demand for sustainable, clean-label meat alternatives grows, SCT could become a game-changer in the plant-based meat industry, bridging the gap between sensory appeal, nutrition, consumer acceptance, and sustainability.

Keywords: Food Structuring, Meat Analogues, Sensory Appeal, Shear Cell Technology, Sustainability

Ginger Alcohol

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ABSTRACT

Ginger alcohol is an emerging fermented beverage that combines the spicy, aromatic properties of *Zingiber officinale* with the complexities of alcoholic fermentation. Ginger has been traditionally valued for its medicinal properties, including anti-inflammatory, antioxidant, and antimicrobial effects. The production of ginger alcohol involves fermenting ginger extracts or juice with selected yeast strains, producing a unique beverage with a distinct pungent taste and potential functional benefits. Variations in fermentation parameters, yeast selection, and aging techniques influence the final product's aroma, flavour, and alcohol content. The bioactive compounds in ginger, such as gingerols and shogaols, may retain their therapeutic properties even after fermentation, making ginger alcohol a potential functional drink. Additionally, innovations in fermentation technology, including controlled microbial cultures and enzymatic processes, can enhance flavour development and product stability. As consumer demand for novel alcoholic beverages with health-promoting properties rises, ginger alcohol presents an opportunity for commercialization. Further research is needed to optimize production methods and validate its potential health benefits.

Keywords: Ginger alcohol, Zingiber officinale, bioactive compounds, yeast, gingerols, shogaols, alcoholic fermentation

Development of Cashew Milk and Almond Milk Incorporated Paneer

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ABSTRACT

Plant Based Milk Alternatives (PBMAs) are the extracts of nuts, oilseeds, cereals, or legumes which are water soluble and blended with water to form a milky emulsion which mimics cattle milk. Plant based milks are nutritionally inferior to bovine milk but offer some benefits such as a higher degree of unsaturated fats, lower cholesterol than cow's milk, low water usage in production, heart health benefits, and high amount of antioxidants. In this study, Plant Based Milks - cashew nut and almond nut milk were used for formulation of paneer. Milks were extracted from nut varieties namely cashew and almond and were utilised in 2 combinations each and 1 control as T1, T2, T3, T4 and controlled as C. T1 and T2 were 1:1 and 1:2 ratio of cashew nut milk and cow milk (6% fat) respectively, while T3 and T4 were 1:1 and 1:2 ratio of almond nut milk and cow milk (6% fat) respectively. Samples were prepared in triplicate and their physicochemical properties and sensory properties were analysed. The moisture content (in %), total ash content (in %), crude fat content (in %), crude fibre (in %), titrable acidity (in % lactic acid content), and protein content (in %) were determined. The results for T1 and T3 revealed were - moisture content (50, 60), crude ash content (1.6, 1.3), crude fat content (16, 15.8), crude fibre (1.3, 2.6), titrable acidity (0.05, 0.04), and protein content (10.5, 9.2) respectively. Sensory score for T1 and T3 concludes that T1 found better results in terms of texture, appearance, and taste. This research explores the idea of preparing paneer prepared using 50% bovine milk and 50% nut milk. Even though such paneer does not compare with protein availability of regular paneer, it is significantly low in fat, has comparable mineral content, and low in lactose. In addition to this, the texture and mouth feel of PBMA incorporated paneer is creamier and softer, thus difficult to mimic in adulterated varieties.

Keywords: Fat, Lactose, Milk, Paneer, Plant-Based Milk Alternatives

Recent Advances in Cold Plasma Treatment (CPT) of Plant Proteins

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ABSTRACT

Cold Plasma Treatment (CPT) is a groundbreaking non-thermal method that has attracted considerable attention in food processing due to its capacity to alter biomolecules with minimal heat damage. Concerning plant proteins, CPT has exhibited potential in enhancing digestibility and bioavailability via structural changes. This study investigates the impacts of CPT on plant proteins, concentrating on crucial processes like protein unfolding, cross-linking, improved enzymatic hydrolysis, and the reduction of anti-nutritional elements that limit amino acid availability. The reactive species produced during CPT interact with protein structures, modifying their physicochemical characteristics to facilitate protein breakdown and nutrient uptake. Moreover, CPT has been proven to diminish detrimental substances, such as protease inhibitors and phytates, which enhances protein absorption. Despite its promising advantages, several obstacles persist, including the lack of standardized treatment protocols, variability in CPT outcomes across various plant protein types, and apprehensions regarding large-scale industrial application. This review compiles recent progress in CPT technology, highlights significant research deficiencies, and examines its potential applications in enhancing the processing of plant-derived proteins. Tackling these challenges through additional research and technological advancements may position CPT as a viable and effective strategy for improving the quality of plant proteins. As the need for high-quality alternative protein sources grows, CPT offers a distinctive and sustainable method to enhance protein functionality and nutritional benefits in the food and functional food sectors.

Pulse Electric Field Technique in Food Processing: A Review

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ABSTRACT

The Pulse Electric Field (PEF) Technique is an innovative non-thermal food processing technology that has gained significant attention for its ability to inactivate microorganisms while preserving the nutritional, sensory, and functional properties of food products. PEF involves the application of short, high-intensity electric pulses to food materials, leading to electroporation of microbial cell membranes, which results in cell death. Unlike conventional thermal processing, PEF significantly reduces heat-induced degradation, maintaining essential bioactive compounds such as vitamins, antioxidants, and enzymes. This technology has gained attention in various food industries, including juice pasteurization, dairy processing, meat tenderization, and extraction of bioactive compounds from plant materials. PEF also enhances mass transfer, improving processes such as drying, fermentation, and oil extraction. This review presents a comprehensive analysis of experimental studies on PEF (highlights methodologies and results), focusing on its mechanisms, process parameters (such as electric field strength, pulse duration etc.), and applications in food preservation, bioactive compound extraction, and structural modification of food components. It has been found that electric field strengths ranging from 10 to 50 kV/cm with pulse durations of 1 to 100 μs have successfully reduced bacterial loads in fruit juices, milk, and liquid food products while maintaining their nutritional and textural characteristics. Studies on enzyme activity reveal that PEF can selectively inactivate undesirable enzymes, such as polyphenol oxidase in juices, without affecting essential nutrients. PEF is also found to reduce cooking time and enhance texture in solid foods such as meat and potatoes due to improved mass transfer. In bioactive compound extraction, PEF-assisted extraction has shown a 20-50% increase in yield of polyphenols, anthocyanins, and essential oils from plant-based materials due to enhanced cell membrane permeability. Comparative studies with conventional methods confirm that PEF achieves superior microbial safety with lower energy consumption and minimal heat exposure. This review also discusses the current advancements and prospects of PEF in industrial food processing. The findings suggest that PEF has the potential to revolutionize food preservation and extraction techniques, provided that technical and economic challenges are addressed.

Keywords: Pulse Electric Field, Non-thermal Processing, Microbial Inactivation, Electroporation, Permeability, High-Intensity Electric Pulses

3D Printing in Food Materials

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ABSTRACT

3D (Three Dimensional) printing is one of the cutting-edge technologies that improved the production of personalized food items with exact control over shape, texture, and nutritional makeup. With its remarkable versatility and customisation across multiple industries, 3D food printing has become a game-changing technology today. Food printing has evolved significantly in the food business. Rapid manipulation, lower manufacturing costs, customizable geometry, increased competitiveness, and benefits in numerous hot research fields have all contributed to the growing interest in 3D printing. A significant invention that has transformed the food sector is edible ink, which offers safe, aesthetically pleasing, and personalized food printing options. The food sector makes extensive use of edible ink for printing food-based pictures for special occasions, labelling and branding food products, and personalizing cakes, chocolates, and pastries. Incorporating sensitive and readily degradable bioactive compounds (BACs) and other functional elements into functional 3D printed food items may be made possible by 3D printing, which would greatly aid in the creation of nutritious food. As a result, 3D printing may play a significant role in boosting fruit and vegetable consumption and improving health. Personalized, reproducible food production, sustainability, and time and energy savings are other benefits.

Keywords: 3D Printing, BACs, Labelling, food printing

Crunch with a Purpose: Nutrient-Rich Chips Crafted from Germinated Black Soybeans, Ragi, and Roasted Flaxseeds

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ABSTRACT

The rising consumer demand for functional and health-oriented snacks has led to the development of nutrient-dense and sustainable food products. This study focuses on the formulation and evaluation of an innovative chip made from germinated black soybeans (*Glycine max*), ragi (*Eleusine coracana*), and roasted flaxseeds (*Linum usitatissimum*), incorporating ingredients with significant nutritional and functional benefits. Germination enhances the digestibility and bioavailability of essential amino acids, vitamins, and bioactive compounds in black soybeans, making them a valuable protein source. Ragi, a rich source of calcium, iron, and dietary fiber, contributes to bone health and improved digestion. Meanwhile, roasted flaxseeds provide omega-3 fatty acids and lignans, which support cardiovascular health and possess antioxidant properties. The formulation was carefully optimized to achieve a balanced composition in terms of taste, texture, and nutritional quality. Proximate analysis revealed a high protein and fiber content, along with a reduction in antinutritional factors, improving overall digestibility. Additionally, functional properties such as antioxidant activity and glycemic response were assessed to establish potential health benefits. Sensory evaluation indicated high consumer acceptability, demonstrating its potential as a nutritious alternative to conventional snack products. This novel product aligns with the growing clean-label and plant-based food trends, promoting the utilization of traditional, climate-resilient crops for sustainable food innovation. By integrating nutrient-rich ingredients and enhancing functional properties, this research contributes to the development of value-added snack foods that cater to health-conscious consumers while supporting sustainable food systems.

Keywords: Germinated black soybeans (Glycine max), Glycemic response, Omega-3 fatty acids, Ragi (Eleusine coracana), Roasted flaxseeds (Linum usitatissimum)

Biobased and edible packaging

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ABSTRACT

Food packaging is evolving, with bio-based and edible materials offering a sustainable, biodegradable, and functional alternative to plastic. Advanced biopolymers like Polyhydroxyalkanoates (PHA) and Polylactic Acid (PLA) provide better biodegradability, flexibility, and heat resistance, making them ideal for eco-friendly packaging. Meanwhile, protein-based films from casein, whey, and soy act as strong oxygen barriers, helping food stay fresh longer. Polysaccharide-based materials, including cellulose nanofibers, alginates, and starch composites, enhance durability and water resistance, making packaging more practical. But sustainability is just the beginning. Functional and smart packaging is taking food protection to the next level. Active packaging, infused with antimicrobial agents, essential oils, silver nanoparticles, and chitosan coatings, helps fight bacterial growth, keeping food safer. Intelligent packaging includes pH-sensitive indicators and freshness sensors, allowing real-time food quality monitoring. Edible films with probiotics and self-dissolving properties are also emerging, with applications in dairy, bakery, and beverages. Despite these innovations, challenges remain in scalability, cost, and regulatory approvals. Researchers are addressing these issues using nanotechnology, enzyme-based degradation, and hybrid biopolymer blends to improve performance and feasibility. Additionally, upcycling agricultural waste into packaging materials is helping create a zero-waste, circular economy. With continuous advancements, bio-based and edible packaging is not only reducing plastic waste but also enhancing food safety, extending shelf life, and improving convenience—paving the way for a greener future in the food industry.

Keywords: Bio-based packaging, Edible packaging, Sustainable packaging, Biodegradable materials, Biopolymers (PHA & PLA), Active packaging, Intelligent packaging, Circular economy

Valorization of Cordia gum: A Natural Hydrocolloid for Functional Food Innovation

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ABSTRACT

Gums, as natural hydrocolloids, play a crucial role in enhancing the functionality and stability of food products. The present study focuses on the extraction, characterization, and functional evaluation of Cordia fruit gum for its application in value-added food formulations. Traditionally used in the pharmaceutical industry, Cordia gum remains underutilized in the food sector. This research aims to optimize the extraction process, ensuring maximum yield while preserving functional properties. The physicochemical characterization, including rheological behaviour, moisture content, solubility, and particle size distribution, was conducted to establish its potential as a functional ingredient. Functional property assessments, such as emulsifying, stabilizing, water-holding, and foaming capacities, were performed to explore its suitability in food formulations. Cordia gum was successfully incorporated into innovative food products, including ginger-garlic paste, flavoured drinks, and nutritional formulations for lactating mothers. The findings highlight Cordia gum as a natural alternative to synthetic stabilizers and emulsifiers, supporting clean-label and sustainable food innovations. The study contributes to bridging the research gap by demonstrating the commercial viability of Cordia gum in functional food applications, paving the way for further exploration in food product development.

Keywords: Functional foods, Cordia gum, hydrocolloids, Value addition, Food stability, Clean-label ingredients, Natural emulsifiers.

Manufacturing Process of Extruded Snacks

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ABSTRACT

Extruded snacks have gained immense popularity due to their convenience, taste, and texture. This study explores the manufacturing process of extruded snacks, focusing on key production stages such as ingredient selection, extrusion parameters, seasoning, and packaging. The research highlights the role of twin-screw extrusion in shaping and expanding snack products, ensuring uniformity in texture and density. The study also examines quality control measures, including moisture control, oil content regulation, and microbiological safety, which are crucial for maintaining product consistency. Additionally, automation and sustainability initiatives, such as energy-efficient processing and waste reduction strategies, are discussed. Through this, we analyse how manufacturers optimise production efficiency while adhering to food safety standards and consumer preferences. The findings provide insights into best practices for extruded snack manufacturing, which can be valuable for food technologists and industry

Keywords: Extrusion technology, snack food manufacturing, quality assurance, automation, sustainability

THEME 5
FOOD SAFETY AND QUALITY

Physio-Chemical, Organoleptic and Antioxidant Properties of Low-Sugar Health Beverage Prepared from Red Dragon Fruit Pulp and Papaya Leaf Juice

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ABSTRACT

There is an increasing interest in nutritious beverage consumption which has good medicinal value. Red dragon fruit and papaya leaf are rich in nutritional content, and antioxidants. This study aims to develop beverages that contribute to a person's health and nutritional needs and also its shelf life. The formulations were developed to optimize the amount of red dragon fruit pulp and papaya leaf juice. Physio-chemical characteristics, antioxidant potential, and sensory qualities of the newly developed beverage were estimated. The results indicate that the directly proportional relationship between the relative amounts of red dragon fruit pulp and with sensorial score of the newly developed product was observed. Among five formulations, the proportion of red dragon fruit pulp and papaya leaf juice in the ratio of 80:20 i.e. TR1 and 1:1.5 concentration of sucralose was found to be the best combination as compared with remaining combinations under study with higher amounts of ascorbic acid and total mineral contents also. The findings may contribute valuable insights into the field of functional foods and nutrition. A unique combination of ingredients offers high antioxidant properties, ascorbic acid, and total minerals for a low-sugar health beverage.

Keywords: Antioxidants, Ascorbic Acid, Papaya Leaf, functional foods, Nutritious beverage

Examine Plant-Based Extruded Meat Analogues Developed from Underutilized Legumes for Nutritional and Protein Quality Assessment

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ABSTRACT

This study explored the use of underutilized legumes (cowpea (CP) and moth bean (MB)) with soy protein (SP) and minor amount of wheat gluten (WG) to develop plant based extruded meat analogue. cowpea and moth bean flour with combined incorporation levels (10%, 15%, 20%, and 25%) to soy protein were extruded at (25, 30, and 35%) moisture content at two different barrel temperature (110 and 120ºc) by using co-rotating twine screw hot extruder. The results showed that good visual texturization was achieved at 20% addition of combined (CP+MB) flour and 10% WG to SP at different MC and BT. Nutritional and protein quality was evaluated and compared with soy chunk as control. According to the results the protein level of the meat analogue was higher (56.59 ± 3.02) than that of the soy chunk (50.31 ± 3.0). In addition, it had less CHO content (21.18 ± 3.53) and more dietary fiber (10.47 ± 0.50%) than the control (8.5 ± 3.02%) in comparison. Additionally, the results also demonstrated that, according to FAO/WHO, there is no shortfall in essential amino acid score for any age group, with the exception of infants, and that the in vitro protein digestibility scores were 82% and the protein digestibility corrected amino acid score of the meat analog ranged from 64 to 91% and implying that the developed mixes produce a healthy meat analogue. All things considered; this study opened the door for value addition to these underutilized legumes by offering insightful information on how raw materials affect the nutritional quality of PBMA applications.

***Keywords**:* Meat analogue, Extrusion texturization, Protein digestibility, Amino acid score and Nutrition.

Effect of Incorporation of Nutri-Cereals on Physico-Chemical and Sensory Attributes of *Gulab Jamun*

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ABSTRACT

Gulab Jamun, a popular Indian sweet, is traditionally made from dhap variety khoa and maida. However, regular consumption of refined wheat flour (*maida*) can have negative health implications, especially for people with celiac disease. This study aimed to develop gluten-free gulag jamun using pearl, kodo and foxtail millets in two different forms, viz., paste and flour forms. Gulab jamun prepared using paste form of millet had lower phytic acid content and higher overall sensory acceptability. Optimized gulab jamun formulations with 30% kodo millet and 35% foxtail millet (paste form) showed better sensory scores than their flour form of millets, though it was still lower than the control. Kodo millet added gulab jamun had highest protein (8.26±0.09%), ash (1.98±0.05%), and carbohydrate (45.13±0.31%) content, while the control sample exhibited highest moisture (33.81±0.17%). Fat content across all the samples was not significantly different ($p<0.05$), ranging from 2.51±0.25% to 12.86±0.08%. Similar trends were observed in foxtail millet and pearl millet samples, where the flour form had the highest protein (8.62±0.12%), ash (2.27±0.14%), and carbohydrates (44.88±0.21%), while the control had the highest moisture (33.75±0.34%). Fat content of all samples were not significantly different ($p<0.05$) (12.38±0.19% to 12.77±0.14%). Foxtail millet gulab jamun exhibited significantly higher phytic acid levels in flour form (49.95±0.21 mg/g) and paste (32.09±0.16 mg/g) compared to the control (11.27±0.07 mg/g). In contrast, kodo millet samples had much lower phytic acid levels in flour form (0.21±0.00 mg/g), paste (0.31±0.00 mg/g), and control (0.11±0.00 mg/g).

Keywords: Gulab jamun, gluten free, millets, phytic acid, sensory acceptability

Nutritional Evaluation of Kodo Millet Health Mixes from Partitioned Low and High Fiber Kodo Millet Flour

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ABSTRACT

Introduction: Kodo millet, a nutrient-rich minor millet, serves as an excellent alternative to staple cereals like rice and wheat, offering 11% protein, 4.2% fat, and 14.3% fiber. It is particularly valued for its high polyunsaturated fatty acid (PUFA) content and abundance of B vitamins. Due to its protein composition and amino acid profile, Kodo millet holds potential as a complementary food. Objectives: This study aimed to fractionate Kodo millet to obtain low-fiber and high-fiber portions for developing two specialized health mixes: Low-Fiber Health Mix (LHM) and High-Fiber Health Mix (HHM). Methodology: Kodo millet was fractionated using three methods—sieving, grinding, and traditional processing—to produce low-fiber (LFKMF) and high-fiber (HFKMF) Kodo millet flour. These flours were then combined with locally available indigenous ingredients to formulate LHM and HHM. Results: Fine flour and course flour (residue) from the grinding method was used to develop the health mixes. Different formulations were evaluated to optimize the amino acid profile, with the least limiting amino acid formulation being finalized. LHM exhibited higher protein (19.20 g/100 g), ash (2.58 g/100 g), and energy (370 kcal), along with significant calcium content (958.57 mg/100 g), rapid digestible starch (47.94%), and lower crude fiber (5.12 g/100 g) and resistant starch (2.61%) compared to Kodo millet flour. The Net Protein Value (NPV) and Protein Digestibility Corrected Amino Acid Score (PDCAAS) of LHM were 13.05 and 46.24%, respectively. HHM was characterized by higher crude fat (3.75 g/100 g), crude protein (16.97 g/100 g), crude fiber (6.19 g/100 g), and ash (1.85 g/100 g), along with lower available carbohydrates (62.07 g/100 g) and in vitro starch digestibility (IVSD). The predicted glycemic index (pGI), glycemic load (GL), and enzyme activities of α-amylase and α- glucosidase for HHM were recorded as 44.31, 17.90, 33.91, and 65.95, respectively. Various local food products were developed using LHM (laddu, kardant, barfi, and bars) and HHM (dhokla, paddu, thalipeeth, dosa, and mudde), which received moderate acceptance on a 9-point hedonic scale. Conclusion: LHM was formulated to support the growth and development of preschool children, contributing approximately 1/6th to 1/8th of their Recommended Dietary Allowance (RDA) for protein and 1/8th to 1/10th of their RDA for energy. HHM was designed for diabetic individuals, featuring a low glycemic index and enhanced α-glucosidase and α-amylase activity compared to Kodo millet flour.

Keywords: Kodo millet, fractionation, complementary foods, diabetes, health mixes.

The Effects of Dual Modification Techniques on Starch Quality: A Systematic Review

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Starch is a versatile ingredient in the food industry, used for thickening, stabilizing, and adding texture to products like sauces, soups, baked goods, and desserts. However, native starch has limitations due to its poor solubility and tendency to retrograde, which can lead to undesirable changes in food quality. To overcome these limitations, starch modification techniques are employed to enhance its properties. Modification methods include physical, chemical, and enzymatic techniques. Physical methods involve thermal and non-thermal processes such as annealing, dry heat, hydrothermal treatment, ultra-sonication, irradiation, high-pressure processing, and cold plasma. Chemical modifications, like cross-linking and oxidation, are also widely used to improve starch functionality. These modifications aim to enhance physicochemical characteristics such as gelatinization, thermal stability, and shear strength, while improving paste clarity and film-forming abilities. Dual modification combines multiple techniques to further enhance starch properties, providing improved functionality and stability across various food applications. This review focuses on starch modification techniques and their effects on starch quality, exploring the impact of dual modification and potential applications of modified starch in different food items.

Keywords: Starch, Dual Modification, Quality of modified starch, Applications of Modified starch, Food Products

Effect Of Different Modification Techniques on Quality Characteristics Of Hydrocolloids: A Systematic Review

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ABSTRACT

Gums are multi-purpose hydrocolloids used in the food industry to enhance the rheological properties of various food products such as sauces, soups, cakes and desserts by thickening, stabilising and texturing. A number of gums are used in the food industry, ranging from different sources such as arab gum, gelledan gum, guar gum, locust bean gum, carrageenan gum, taro gum, cellulose gum, tragacanth gum and cassia gum. Natural hydrocolloids often have drawbacks which may affect their rheological properties and overall performance in culinary applications, such as variable solubility, poor thermal stability and susceptibility to deterioration. These restrictions need to be adapted in order to improve their performance and versatility in a wide range of food applications. Methods of modification include physical, chemical and enzymatic methods. Physical methods include thermal and non-thermal processes such as annealing, dry heating, hydrothermal treatment, ultrasonic treatment, irradiation, high pressure processing and cold plasma. Chemical modifications such as cross-linking and oxidation are also widely used to enhance the hydrocolloid function. These modification techniques improve the rheological, emulsion and solubility characteristics of hydrocolloids. These changes also increase the thermal stability, hydrophobicity and mechanical strength, which make hydrocolloids more versatile. This review explored the impact of modification techniques on the quality characteristics of hydrocolloids and the potential uses of modified hydrocolloids in food, pharmaceuticals and industrial products.

Keywords: Hydrocolloids, Physical modification, Chemical modification, Quality characteristics, Applications, Food industry, Gums

Physicochemical and Sensory Attributes of the selected Plant-based Milk Analogues

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ABSTRACT

The consumption rate and consumers' interest in plant-based diets have led to a shift in dietary habits, focusing on replacing traditional animal-derived milk with plant-based alternatives like plant-based milk analogues (PBMAs). The growing interest in plant-based diets has led to a shift in dietary habits focusing on replacing traditional animal-derived milk with plant-based alternatives like plant-based milk analogues (PBMAs). This trend is particularly evident in the global market, where milk derived from plants is being widely used. The main aim of this study is to develop milk from cowpea, peanut, and little millet, evaluate the plant-based milk as sustainable and nutritious dairy milk substitutes for which high-quality raw materials were procured, and provide preliminary processing techniques (soaking, roasting, boiling). Physical, chemical, and organoleptic evaluations were conducted with the most sensorily acceptable sample selected for innovative food products. Both cowpea and peanut milk gave an optimum yield of 250 ml i.e., (20gm of sample in 100ml water-after optimization). These plant-based milk alternatives (PBMAs) exhibit high nutritional value, with variations in macronutrient and micronutrient composition among the three samples. Peanut milk demonstrated the highest protein content (4.8 g/100 g) and phosphorus levels (32 mg/100 g), while little millet milk exhibited the highest iron content (9.2 mg/100 g). Cowpea milk was notable for its carbohydrate (4.6 g/100 g) and protein content (4.1 g/100 g). Among the three milk samples extracted, peanut milk which underwent roasting and soaking as pre-treatment was the most sensorily acceptable sample which also exhibited the highest viscosity (50.2 cP), suggesting enhanced texture and mouthfeel. These PBMAs are suitable for diverse culinary applications, catering to individuals with dietary restrictions or preferences. Further research is required to optimize their quality, functionality, and consumer acceptance, thereby fostering innovation and sustainability in the global food system.

Keywords: Plant-based foods, Physicochemical, Sensory evaluation, Consumer Acceptance.

Gamma Irradiation Modifies the Structural, Thermal And Functional Properties Of Sorghum Protein Isolates

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ABSTRACT

Sorghum protein isolates were prepared and subjected to gamma irradiation to evaluate its effects on their physicochemical, molecular, and thermal characteristics compared to control sample. The lightness L* value was significantly reduced ($p < 0.05$) and the redness a* and yellowness b* values were significantly increased as a result of gamma irradiation. It also enhanced solubility, emulsification capacity, stability, turbidity, surface hydrophobicity and antioxidant properties while reducing molecular weight, which signified improved functional properties. Protein denaturation temperature (Td) and enthalpy (ΔH) both rose after irradiation. The effects of irradiation on the diameters of the crystallites were suggested by the three separate diffraction peaks seen at $2\theta = 9.05°$, 19.3°, and 21.5°, as shown by X-ray diffraction (XRD) analysis. Weight loss studies and SDS-PAGE analysis revealed structural and conformational changes in the protein, suggesting better thermal and functional performance as well as increased solubility. Scanning electron microscopy revealed crack formations on the protein particle surface following irradiation. Treatment also resulted in a reduction in the protein dispersion's storage modulus (G') and loss modulus (G"), which indicate alterations in the viscoelastic characteristics.

Keywords: Sorghum; Protein; Gamma irradiation; Structure

Revolutionizing Food Safety: The Role of AI In Pathogen Detection

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ABSTRACT

According to the statistics of World Health Organization (WHO), Food borne pathogens, like *E. coli, Salmonella, Listeria, Shigella, Fungi, Norovirus* etc causes over 600 million illnesses and over 4 million deaths annually. These pathogens can cause illness even though present in food at tiny counts. Therefore, to ensure food safety, it is important to develop highly sensitive and reproducible detection tests for pathogens. Traditional methods include culture-based techniques, immunoassays, and nucleic acid-based approach (Polymerase Chain Reaction, PCR). However, these approaches frequently have key obstacles such as long analysis time, requirement for skilled analysts and low sensitivity. With the recent boom in Artificial Intelligence (AI), its potential in pathogen detection and safeguarding public health can be anticipated. This review aims at tracking progress of AI in the field of food pathogen detection over the past 5years (2020-2025). The literature search was carried out using multiple scientific databases including PubMed, Scopus, Web of Science, and Google Scholar. The search terms included all sorts of related keyword combinations including "Food safety," "Artificial intelligence," "Pathogen detection," "Predictive models," and "Foodborne illnesses". It was found that AI assisted hyperspectral microscopy combined with LSTM algorithm can identify different pathogens in food with 0.85 accuracy. Deep learning algorithms are also found to be effective in detection of multiple microorganisms, including *E. coli* and *Fungal* contamination with average precision of 0.94-0.95. Although AI offers the advantage of quick, hassle-free detection, yet the challenges of data dependence, cost, regulatory issues need to be resolved.

Keywords: Artificial Intelligence, Food borne pathogens, Food safety, Hyperspectral imaging, Pathogen detection.

Assessing Labelling Transparency and Heavy Metal Contaminants In Commercial Protein Powders

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ABSTRACT

This study aims to evaluate the transparency of nutritional labelling in commercially available protein supplements in India, assess their compliance with FSSAI regulations, and investigate the risk of heavy metal contamination through MP-AES analysis. A systematic market survey was conducted with 100 protein supplements sourced from various e-commerce sites in India. The packaging labels of those products were manually screened to check for any possible violation of the FSSAI issued labelling regulation. Six products with maximum number of labelling violations detected were tested for presence of heavy metals through MP-AES. Severe cases of "mislabelling" were found. 20% of the screened products did not have "how to use" information, 26% did not mention mandatory warning statements and 30% did not declare warning about possible presence of allergens. 37% of the cocoa containing samples had Stevia, which is banned by FSSAI in cocoa containing food. Ingredients list was incomplete for 10% samples. Only the name and percentage of the protein component was mentioned, leaving the remaining mass unaccounted. No product disclosed use of any preservatives but claimed unusually long shelf lives. These findings reveal multiple labelling violations in protein supplements and strongly recommend chemical testing for unpermitted additives. MP-AES analysis of selected protein powders detected presence of varying levels of heavy metals. Arsenic concentration was found to be exceeding the permissible limits in most of the samples whereas lead and mercury were found in a few. Presence of these contaminants underscores the necessity for stringent quality control and raising public awareness.

Keywords: Heavy metal contamination, Market survey, Mislabeling, MP-AES, Protein supplements.

A Systematic Approach to Investigate Labelling Accuracy of Commercially Available Indian Baby Foods

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ABSTRACT

Labels printed on the package of any processed food is the only way to get information about the content inside. Consumption of food with inaccurate labels or (Mislabeled) may have a severe impact on the consumers' health. The impact is even more in case of baby foods where the consumers are less than two years old. Cases of mislabeling are on rise in the packaged food sector due to huge opportunities for financial gain. Therefore, it is important to assess the occurrence and severity of mislabeling in commercially available baby foods. In this project 110 such products (weaning mixes, ready-to-eat finger foods, and purees) with the intended use mentioned upto 24 months of age or having the word "baby" printed on the package, sold on Indian e-commerce sites were studied. The labels printed on the package were manually screened for FSSAI regulation compliance, including completeness of disclosed information, statutory warnings, and unjustified health claims. The results revealed significant violations; 40% did not mention the appropriate age group, 80% lacked statutory warnings, 80% omitted serving size details, 70% did not disclose information on added sugar, and 40% had unjustified health claims. Nutritional analysis was performed on 10 products where maximum number of mislabelling's were observed. These products were tested for total carbohydrate and fat content and presence of regulated preservatives (BHA, BHT) and unpermitted dyes (Metanil yellow, malachite green). Results of this study highlight the need for stricter regulatory enforcement to ensure the safety of baby food products in India.

Keywords: Baby foods, FSSAI, Mislabeling, Nutritional analysis

Anti-Nutritional Factors in Insects and Their Impact on Nutrient Absorption

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ABSTRACT

Insects are regarded as a necessary food item in many nations and ethnic groups. When it comes to nutrition, insects contain a significant amount of protein. Insects are high in lipids (13–33%), protein (35–61%), and "animal" fibre (insoluble chitin) in significant amounts. Certain insects are well-known for having rich vitamin and mineral profiles in addition to macronutrients. However, the types of insects, food, developmental stage, sex, and growing environment all affect the anti-contents. The present article gives a summary of the nutritional value of a few selected insect species and orders to illustrate the potential of insects as a source of essential nutrients for the human diet. The bioavailability and bio accessibility of nutrients for insects are poorly understood; most research focuses on the composition and characterization of nutrients. Like any other food, the amount of nutrients that are bioavailable depends greatly on how it is prepared and processed. There is also a brief discussion of the research studies' gaps and the potential for more research.

Keywords: bioaccessibility, micronutrient deficiencies, amino acids, sustainable food sources, environmental sustainability

Shelf-Life Extension of Guava and Eggplant Fruits Using Chitosan-Sodium Alginate Based Antimicrobial Composite Coating Functionalized with Clove-Soy Lecithin Nano emulsion

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ABSTRACT

Effects of chitosan-sodium alginate composite coatings functionalized with clove-soy lecithin nanoemulsion were investigated on the postharvest shelf life and quality characteristics of guava and eggplant fruits at room storage condition (23±3°C, RH- 60-65%) were investiagted. The postharvest characteristics such as weight loss, acidity, TSS, respiration rate, antioxidant activity and visual appearance of the fruits were determined up to 12 days of storage. The results revealed that the application of chitosan-sodium alginate composite effective to maintained higher postharvest characteristics of guava and eggplant fruits as compared to control and coating with alone chitosan and sodium alginate. The F3 (50:50, chitosan-sodium alginate) composite coating was found most significant with retarded the weight loss in guava and eggplant. On 12 days of storage, the significantly ($p>0.05$) lower weight loss (9.24%, 10.9%), respiration rate (22.48 mgCO2kg-1h-1, 18.78 mgCO2kg-1h-1), total soluble solids (9.87°Brix, 4.96 °Brix) with higher maintained of titratable acidity (0.49%, 0.36%), antioxidant activity (53.745%, 33.09%) and total phenolic content (129.74 mg/100g, 49.09 mg/100g), respectively was found in guava and eggplants fruits treated with F3 composite coating formulation followed by F4 and F2 coating formulations. The control (distilled water) samples showed higher weight loss (18.02%, 21.84%), TSS (10.78 °Brix, 5.78°Brix), with lower values of acidity (0.29%, 0.22%), antioxidant (39.12%, 23.01%) and total phenolic content (89.64 mg/100g, 32.86 mg/100g), respectively in both guava and eggplant fruits, respectively.

***Keywords**:* Edible coatings, Postharvest management, Nano emulsion, Guava, Eggplants, Respiration rate

Studies on Effects of Drying Methods on Quality Characteristics Of Tomato Pulp Leather

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ABSTRACT

This study investigates the impact of different drying temperatures (60°C, 65°C, and 70°C) on the drying characteristics and quality attributes of tomato pulp leather processed using a tray dryer and a hot air oven. Among the tested samples, the optimal formulation (T3) was identified based on sensory evaluation, where drying at 70°C in a tray dryer for 7 hours yielded superior quality retention and the highest drying efficiency. The T3 sample exhibited a moisture content of 18.5%, ash content of 1.62%, pH of 4.40, total sugar content of 13.63 g/100 g, vitamin C content of 16.13 mg/100 g, total soluble solids (TSS) of 78.40 °Brix, and reducing sugar content of 8.40 g/100 g. During storage (15, 30, and 45 days), a progressive decline in moisture content, ash content, pH, total sugar, and vitamin C was observed, whereas TSS and reducing sugar levels increased over time. These findings provide insights into the influence of drying conditions on the physicochemical stability of tomato pulp leather during processing and storage.

Keywords: Drying methods, hot air oven, physicochemical properties, storage stability, tomato pulp leather, tray dryer.

The Role of Food Safety and Food Quality On Public Health: A Review

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ABSTRACT

Food is a fundamental human need that is necessary for survival. Its safety, however, has become a key worry for the food business, as the intake of tainted food and water contributes to a variety of health concerns around the world. Food safety is the regulation, preparation, and storage of food to reduce the danger of foodborne illness, and it is a global concern. The World Health Organization has highlighted food safety as a crucial worldwide concern and listed five key practices: preserving cleanliness, separating raw and ready-to-eat food, cooking, adequate temperature management, and thorough raw material inspection. Food quality is made up of features such as appearance (size, shape, color, gloss, and consistency), internal variables (chemical, physical, and microbiological), texture, and flavor. Food quality and safety are the primary areas of inquiry in food production. As a result, accurate methods for detecting, identifying, quantifying, characterizing, and monitoring food quality and safety issues are in high demand. Food safety is a critical part of food security that is receiving more global attention as the frequency of widespread foodborne events grows. Manufacturers and distributors must be aware of and responsible for implementing Good Handling Practice (GHP), Good Manufacturing Practice (GMP), and Hazard Analysis Critical Control Point (HACCP). The purpose of this paper is to make people understand the concept of food safety and quality and to develop and implement policies and practices that provide universal access to health food choice

Keywords: Food safety, Food security, Food quality, Foodborne illness, World Health Organization

To Study Drying Kinetics and Quality Analysis of Pre-Treated Lotus Rhizome Slices

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ABSTRACT

This study explores the optimization of the blanching and drying processes for lotus rhizome slices (*Nelumbo nucifera Gaertn*.) sourced from the Kanpur market. The slices underwent microwave blanching at 900 W for 50 sec. and steam blanching , followed by a drying treatment utilizing a tray dryer at 60°C with varying air velocities of 0.8, 1.0, and 1.2 m/sec. The results indicated that microwave blanching significantly enhanced water loss during drying. The selected blanching conditions effectively reduced the hardness and shrinkage of the slices. It was found that drying rates were inversely related to slice thickness and mass at a constant temperature, while elevated temperatures correspondingly increased drying rates. Notably, blanched slices demonstrated superior drying performance compared to unblanched ones. Through graphical analysis of drying rates and moisture ratios, we identified the optimal model for the drying process, providing critical insights into the relevant processing parameters. Further analysis included assessments of the rehydration ratio, weight loss ratio, shrinkage rate, total phenolic content (TPC), total flavonoids content (TFC), antioxidant activity, and ascorbic acid levels. The findings from this study contribute valuable data to the field of food processing, particularly for optimizing the quality and nutritional value of lotus rhizome products. This research highlights the potential for enhanced processing techniques.

Keywords: drying kinetics, rhizome slices, pre-treated lotus

Physicochemical And Sensory Attributes of The Selected Plant-Based Milk Analogues

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ABSTRACT

The consumption rate and consumers' interest in plant-based diets have led to a shift in dietary habits, focusing on replacing traditional animal-derived milk with plant-based alternatives like plant-based milk analogues (PBMAs). The growing interest in plant-based diets has led to a shift in dietary habits focusing on replacing traditional animal-derived milk with plant-based alternatives like plant-based milk analogues (PBMAs). This trend is particularly evident in the global market, where milk derived from plants is being widely used. The main aim of this study is to develop milk from cowpea, peanut, and little millet, evaluate the plant-based milk as sustainable and nutritious dairy milk substitutes for which high-quality raw materials were procured, and provide preliminary processing techniques (soaking, roasting, boiling). Physical, chemical, and organoleptic evaluations were conducted with the most sensorily acceptable sample selected for innovative food products. Both cowpea and peanut milk gave an optimum yield of 250 ml i.e., (20gm of sample in 100ml water-after optimization). These plant-based milk alternatives (PBMAs) exhibit high nutritional value, with variations in macronutrient and micronutrient composition among the three samples. Peanut milk demonstrated the highest protein content (4.8 g/100 g) and phosphorus levels (32 mg/100 g), while little millet milk exhibited the highest iron content (9.2 mg/100 g). Cowpea milk was notable for its carbohydrate (4.6 g/100 g) and protein content (4.1 g/100 g). Among the three milk samples extracted, peanut milk which underwent roasting and soaking as pre-treatment was the most sensorily acceptable sample which also exhibited the highest viscosity (50.2 cP), suggesting enhanced texture and mouthfeel. These PBMAs are suitable for diverse culinary applications, catering to individuals with dietary restrictions or preferences. Further research is required to optimize their quality, functionality, and consumer acceptance, thereby fostering innovation and sustainability in the global food system.

Keywords: Plant-based foods, Physicochemical, Sensory evaluation, Consumer Acceptance.

Antifungal Activity of Seaweed Ulva Lactuca Ethanol Extract Against Penicillium And Rhizopus Species

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ABSTRACT

The worldwide food supply is greatly impacted by food-borne pathogenic fungi, which are responsible for postharvest decay of fresh horticultural produce. The postharvest losses caused by these fungi not only reduce the quality and quantity of the produce but also lead to huge financial losses. The possibility of using the extract of green algae *Ulva lactuca* as a natural postharvest fungicide to control the growth of these fungi is examined in this work. The biological activity of the ethanolic extract of this seaweed, commonly known as sea lettuce, was in vitro evaluated against the growth of *Penicillium aurantiogriseum, Rizopus stolonifera*, and *Penicillium glabrum*. The study demonstrated the concentration-dependent antifungal activity of *U. lactuca* extract, particularly against *R. stolonifera*. The minimum inhibitory concentration (MIC) value of 100 µL/mL was observed for all the tested pathogens. These results suggest that the ethanoic extract of *U. lactuca* could be an effective natural fungicide, with potential applications in food preservation and other industries where fungal contamination is a concern. It has possibility also in managing fungal diseases in organic farming and sustainable agricultural practices.

Keywords: food-borne, Ulva lactuca, sustainable, organic farming, in vitro

Quantification of Pigments In Different Brown Algal Species

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ABSTRACT

Algae are a rich source of bioactive pigments, such as chlorophylls and carotenoids, which play essential roles in photosynthesis and possess significant industrial and nutritional value. This study aimed to quantify the pigment composition in four brown algal species from the Fucaceae and Laminariaceae families. High-performance liquid chromatography with a diode-array detector (HPLC-DAD) was used to accurately determine the concentrations of chlorophyll a, chlorophyll b, β-carotene, and lutein. The results revealed notable differences in pigment composition among the algal species. Fucus vesiculosus (FV) exhibited the highest levels of chlorophyll a (18.2 mg/L) and β-carotene (11.3 mg/L), while Laminaria ochroleuca (LO) contained 11.8 mg/L of chlorophyll a and 7.3 mg/L of β-carotene. In contrast, Saccharina latissima (SL) and Pelvetia canaliculata (PC) had lower chlorophyll a concentration between 0.4 and 3.5 mg/L. Chlorophyll b was found in low amounts, in ranges between 0.1-0.2 mg/L with FV showing the highest content. Lutein was present in small amounts across all species, ranging from 0.03 to 0.05 mg/L. These findings highlight the diverse pigment composition of different algal species and contribute to understanding pigment distribution in algae, with potential implications for their application in the food, health, and biotechnology industries.

Keywords: Algae, Pigments, HPLC-DAD, Chlorophyll, Carotenoids.

Camellia Japonica Leaves: A Promising Source Of Nutrients And Bioactive Compounds For Sustainable Food Systems

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ABSTRACT

Camellia japonica, a member of the Theaceae family, is an Asian plant intentionally introduced worldwide for ornamental purposes. However, increasing scientific research suggests its potential for applications in various industries, including food and pharmaceuticals. In this regard, several studies have highlighted the antioxidant, antimicrobial, and antitumor properties of *C. japonica* flower varieties (1). Nevertheless, there is limited evidence regarding the potential uses of its leaves - which are of significant commercial importance in other Camellia species, such as *Camellia sinensis*, used for tea production. Building on this knowledge gap, this study aims to evaluate the nutritional composition, bioactive content, and antioxidant activity of *Camellia japonica* leaves, exploring their potential application in functional foods (2). The data show that *Camellia japonica* leaves contain 4.19% protein and 2.9% lipid. These rates reveal that the leaves have a moderate nutritional value. In addition, the total phenolic content was determined to be 36.7 mg GAE/g dry weight, demonstrating a high concentration of bioactive compounds with potential antioxidant properties. This antioxidant potential was further confirmed through a DPPH assay, which yielded a value of 23.7 µg/mL, validating the leaf extract's free radical scavenging activity. These results indicate that *Camellia japonica* leaves have the potential to be used as a nutritional enhancement ingredient in sustainable food systems and may contribute to the production of functional foods. However, further in vivo and clinical studies are needed on bioavailability, metabolic effects and possible health benefits of these bioactive components.

Keywords: *Camellia japonica*, functional foods, bioactive compounds, antioxidant activity, sustainable nutrition.

Evaluation Of PAHS Traces in Macroalgae Extracts.

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ABSTRACT

Macroalgae are an important food source that provides essential nutrients and are traditionally part of the human diet, especially in Asian countries. Moreover, due to their secondary metabolites, the obtention of extracts aimed at the food industry has garnered significant interest for their potential health benefits, including antioxidants, anti-inflammatory, and antimicrobial properties, among others. It is also known that polycyclic aromatic hydrocarbons (PAHs) can be present in coastal areas due to industrial runoff, and maritime traffic or urban pollution, raising concerns about the safety and quality of macroalgae used for human consumptio. These contaminants can accumulate in macroalgae and pass to extracts highlighting the need for rigorous testing and monitoring before being incorporated into food products. In this work, two popular edible seaweeds, *Himanthalia elongata* and *Undaria pinnatifida,* commonly known as sea spaghetti and wakame, were collected from the Galician (Spain) coast and subjected to microwave-assisted extraction. The resulting extract was screened for the presence of 16 PAHS by HPLC coupled with fluorescence detectors and the results indicate the absence of all priority compounds defined in the European legislation and the presence of negligible amounts of naphthalene in *U. pinnatifida* and benz(a)anthracene in *H. elongata* extracts. Based on these findings, we can determine that the extracts are safe for ingestion regarding PAHS

Novel Non-Thermal Method for Shelf-Life Extension of Green Seedless Grapes

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ABSTRACT

Plasma Activated Water (PAW) is a new non-thermal technology that uses reactive species to reduce microbial load in food. The study focused on effect of PAW on shelf life extension and quality retention of green seedless grapes. Samples were treated with PAW and stored under two conditions (ambient, 27 ± 3 °C; and cold, 12 ± 1 °C) to assess the impact of storage temperature on shelf life. Microbial load was evaluated by measuring the total aerobic bacterial count. The impact of treatments on enzyme activities (polyphenol oxidase, PPO**;** Peroxidas**e,** POD, and Phenylalanine Ammonia-Lyase, PAL) was assessed through bio-chemical assays. Total soluble solids (TSS) were determined using a refractometer, and pH was measured with an Eutech pH meter. Color was analyzed using a color measurement system and the firmness of the fruit was assessed by penetrometer. The PAW treatment significantly decreased the total aerobic bacterial count. Grapes stored at cold temperatures remained fresh for up to 15 days, while those stored at ambient temperature showed a higher rate of decay by the end of sixth day. At ambient temperature, PAW treatment reduced the activity of PPO and POD by 3.3 and 1.0 fold, respectively. Control samples had a lower fruit firmness (2.7 ± 0.04 and 2.6 ± 0.02 KJ/m²), while PAW-treated samples were more firm (4.2 ± 0.01 and 4.5 ± 0.01 KJ/m²) at ambient and cold temperatures, respectively. Overall, PAW treatment was effective in extending shelf life and preserving the quality of green seedless grapes.

Keywords*:* Plasma activated water, shelf life, green grapes, color.

Nutritional Evaluation of Local and Improved Varieties Of Finger Millet: A Nutri-Cereal For Sustainable Food System

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ABSTRACT

According to the report of UNICEF in 2023 hunger and moderate/severe food security is impacting approximately 733 million and 2.33 billion people, respectively around the globe. Furthermore, the world is currently engulfed in various other multifaceted issues associated with food security and management. Finger millet is a sustainable solution to the aforesaid issues as it is climate resilient, nutritionally rich and grown with agricultural ease in arid and semi-arid regions. Hence, in the present study, seven different varieties of finger millet were procured and analysed for their nutritional evaluation. Three local varieties (LV_1, LV_2, and LV3) were procured from the local markets in Karnataka and four improved varieties (KMR630, KMR316, KMR340, MR1) were procured from ICAR-UAS. The functional properties (bulk density, WAC, OAC, dispersibility, and swelling power), proximate analysis, and physical properties of all the varieties were determined. The results indicates that the analysed parameters vary significantly at $p<0.05$ wherein the highest moisture was recorded in KMR316 (9.48±0.65%). For functional properties the highest bulk density (seeds) were observed in LV_2 (0.76±0.00 g/ml) while KMR 340 showed highest bulk density (flour) (0.60±0.00 g/ml). LV_3 reported highest WAC (1.48±0.16 g/g) while LV_2 showed maximum OAC (1.43±0.23 g/g). MR_1 reported highest 1000 grain weight (2.95±0.00 g) and 1000 grain volume (4.13±0.00 ml). Crude protein, crude fibre, ash, dispersibility, swelling power was also determined. The obtained results indicate that finger millet is a nutritionally valuable source and will play a crucial role in sustainable food system.

Keywords: finger millet, nutritional evaluation, food security, hunger

Advances in Electrochemical Biosensors for Food Safety and Preservation: Smart Technologies for Rapid Pathogen Detection and Contaminant Monitoring

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ABSTRACT

The rapid advancement of electrochemical biosensors is revolutionizing food preservation and food safety through the ability to instantly detect pathogens sensitively and specifically using smart sensing technologies. Biosensors use two-dimensional (2D) nanomaterials, such as graphene, transition metal dichalcogenides, and MXenes, to enhance the detection efficiency of food contaminants, such as nitrites, heavy metals, antibiotics, and pesticides. Their integration with microfluidic and point-of-care (POC) systems allows portability and low-cost deployment to address serious issues in the assessment of food quality. The evolution of electrochemical biosensors indicates improvements in bioreceptor specificity, signal amplification strategies, and device miniaturization for on-site monitoring. New biosensor technologies incorporate molecularly imprinted polymers and aptamers to enhance selectivity and stability. Impedance spectroscopy and voltammetry were performed to ensure the accuracy of quantitative measurements. In addition, food supply chain monitoring is driven by the incorporation of smart packaging and Internet of Things (IoT)-based biosensors. Nevertheless, there remain major challenges to large-scale commercialization, standardization, and regulatory approval for the use of electrochemical biosensors in food safety. Future work needs to focus on improving sensor reproducibility, multiplex detection capabilities, and artificial intelligence integration for predictive analysis. These advancements will ensure safer food consumption, reduce economic losses from contamination, and enhance sustainable food engineering practices.

Keywords: Electrochemical biosensors, food safety, pathogen detection, nanomaterials, smart monitoring, sustainability, food preservation

Nutritional Profiling of Developed Ready to Eat Breakfast Cereal Using Popped *Sorghum Bicolor* and *Eleusine Coracana*

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ABSTRACT

This study presents the development of a novel breakfast cereal formulated from popped sorghum and popped finger millet, enriched with a blend of seeds, nuts, raisins, jaggery, and honey. The study objective was to formulate, optimize and evaluate nutrient efficiency of breakfast cereal that can be easily accepted by all individuals. Popped sorghum and popped finger millet were selected as the base ingredients owing to their nutrient potential. For optimization, The Box–Behnken design of Design Expert Software (version 13.0; StateEase 2023) was used with independent variables (popped sorghum, popped finger millet, nuts and seed mix, and flavour mix) and dependent variables (protein, energy and overall acceptability). The physiochemical analysis revealed that the optimized product showed a 7.8±0.01 pH value, a bowl life of 3.2 minutes, 0.79±0.03 bulk density and good oil absorption and water absorption capacity. The nutrient analysis revealed that optimised breakfast cereal contains 1.32±0.02% moisture, 2.43±0.05% ash, 61.00±0.1g carbohydrates, 354.41±0.7kcal energy, 10.24±0.2g protein, 8.53±0.05g fat and 5.25±0.10 crude fiber. Through micromineral estimation, it was found that breakfast cereal contains calcium 15.6% of Recommended Dietary Allowances (RDA) whereas other minerals such as iron, zinc, magnesium, manganese, phosphorus, and copper accounted for more than 33% of the RDA of moderately active males. The antioxidant profile revealed that the breakfast cereal show DPPH radical scavenging activity (%) 92.56±0.03%, IC50 value 57.86±0.02 μg/g, TPC 67.20±0.01 mg GAE/100 g and TFC 78±0.17%. On comparison with commercial product, the formulated breakfast cereal stands out better in terms of protein and microminerals. This product aligns with current consumer trends favouring nutritious and convenient options that cater to diverse dietary needs.

Keywords: Breakfast Cereal, popped Finger Millet, Popped Sorghum, Optimisation, Nutrient Evaluation

Exploring the Impact of Goat-Cow Milk Admixtures on the Characterization and Metabolite Profile of Feta-Type Cheese

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ABSTRACT

Feta, a white, soft-ripened cheese, is one of the most renowned and traditional Greek cheeses, traditionally made from goat's milk or a combination of goat and sheep milk. With the global Feta cheese market reaching USD 11.5 billion in 2023, demand for this cheese continues to rise. However, the limited availability of goat and sheep milk poses a challenge in meeting this growing demand. To address this, exploring milk combinations from different species offers a potential solution for optimizing Feta cheese production. Results revealed that Feta cheese prepared in different combinations of G100, G70:C30, G60:C40, G50:C50, and C100 admixtures had a meltability (mm) of 1.06±0.08, 1.33±0.16, 2.45±0.90, 2.84±0.71 and 1.61±0.77, flowability (mm) of 18.00±0.00, 40.33±0.57, 100.33±17.89, 51.66±18.47 and 8.00±3.46, respectively. A gel electrophoresis and Fourier transform infrared spectroscopy technique were employed to analyse protein patterns and functional groups, revealing significant differences in protein structure between different milk admixtures. Fatty acid profiling using gas chromatography-flame ionization detection indicated notable differences in lipid composition, with goat milk-rich cheeses exhibiting a higher proportion of medium-chain and unsaturated fatty acids. Confocal laser scanning microscope demonstrated a more uniform distribution of protein and fat in formulations. Metabolite profiling of feta-type cheese using gas chromatography-mass spectrometry revealed 42 distinct metabolites, including acetic acid, lactic acid, glycerol, and various fatty acids, which play a crucial role in defining its flavor, texture, and microbial stability. Additionally, health-promoting metabolites such as oleic acid, myo-inositol, dodecanoic acid, decanoic acid, and hexadecanoic acid were identified, offering potential benefits for heart health, digestion, and metabolic regulation. These findings provide critical insights into the biochemical and structural modifications induced by admixture of milk, contributing to the optimization of Feta cheese formulation and enhancement of its nutritional properties.

***Keywords**:* feta type cheese, protein pattern, functional groups, metabolites

Comparative Analysis of Nutritional Quality Characteristics of Desi Chickpea (*Cicer Arietinum* L.) Microgreens Var. Pusa-3062 And Pusa-4005 Grown Under Controlled Conditions

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ABSTRACT

Microgreens have emerged as "living functional foods", bearing a couple of fully expanded cotyledonary leaves. Popular for their rich flavor, colour, texture and swift life cycle (7-30 days) young greens possess significant proportions of phyto-chemicals. The present study was aimed to compare the biomass and nutritional quality of microgreens from two chickpea genotypes viz. Pusa -3062 and Pusa-4005 at weekly intervals over a span of 28 days after sowing (DAS), when grown under controlled conditions. Overnight soaked seeds were sown on sand beds in plastic trays, kept in dark for 48 hours before transferring to ambient growth conditions of temperature (25 ± 2^0C), humidity (50±5%) and light (~10,000 lux). Percentage seed germination was approximately 65% in both genotypes. Shoot height and number of compound leaves was higher in P-3062 at 28^{th} day. Similarly, the fresh weight of microgreen shoots increased by nearly 3 - 4 times (28 DAS). Moisture, ash, antioxidant activity (%) and vitamin C content was maximum at 7^{th} day. Contrarily, total phenols were maximum at 14^{th} day, in both genotypes. P-4005 had higher moisture and ash content i.e. 93.57±1.90% and 60.52±9.82%, respectively. However, antioxidant activity was approximately equal in P-3062 (83.95±0.48%) and P-4005 (84.15±0.68%) but concentration of vitamin C was more in P-3062 viz. 156.42±1.34 mg/100 grams. Further, the concentration of total phenols was comparatively greater in P-4005 microgreens i.e. 563.68±29.87 mg/100 grams Gallic Acid Equivalent (GAE). Therefore, microgreens are highly nutritious and good for consumption up to 14^{th} day while microgreens of genotype P-4005 are more nutritious and biomass rich.

Keywords: antioxidants, biomass, microgreen, nutrients, vitamin C

STUDIES ON REPLACEMENT OF SODIUM CHLORIDE WITH MAGNESIUM CHLORIDE IN BLACK GRAM PAPAD

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ABSTRACT

Papad is one of the favorite snack foods liked by all age groups where the use of sodium chloride is greatly varied. Consumption of high amounts of sodium chloride is the major cause of hypertension. In this study a thorough investigation was carried out to determine the optimal salt combinations when magnesium chloride was used to partially replace sodium chloride. Five different treatments were performed using various percentages of salt with addition of herb and spices. The developed papads were analyzed for physiochemical, colour and sensory properties. Storage study was conducted at room temperature (25±5°C) in low- and high-density polyethylene. According to the results the black gram papads made with 25% replacement of sodium chloride with magnesium chloride obtained higher overall acceptability score and they remained good up to 135 days and 255 days in low density polyethylene and high-density polyethylene respectively in raw form. Thus, reduced sodium content of developed papad could be helpful in minimizing risk of high blood pressure.

Keywords: Common salt, high density polyethylene, raw papad, sodium

Development And Evaluation of Functional Attributes and Shelf Life Of Probiotic Processed Cheese

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ABSTRACT

Processed cheese a popular variety of cheese is generally devoid of lactic organisms. Incorporation of probiotic organism in processed cheese will provide functionality and health beneficial property to the product with an increased market acceptability. Hence, the present study was undertaken to prepare probiotic processed cheese (PPC) with the objectives to check the survival of the probiotic organism in simulated gastrointestinal conditions in processed cheese matrix and an estimation of its shelf life in different packaging materials at refrigerated condition. Probiotic processed cheese prepared by incorporating Lactobacillus plantarum had 46 % moisture, 28 % fat and probiotic count of 7.8 log CFU/g. PPC had higher antioxidant and ACE inhibitory activity as compared to control processed cheese with comparable sensory and compositional attributes. Probiotic count of processed cheese was microbiologically within limit up to 30 days of storage. Sensory scores of all attributes were reduced during storage and probiotic count was initially increased up to 20 days of storage followed by decrease. Moisture content decreased during storage, whereas, hardness, acidity and bio-functional attributes enhanced during storage. Two packaging material (PET and PP) were used for storage study of PPC and higher viability of probiotic organism was observed in PET packaging material. The storage and loss modulus of probiotic processed cheese decrease during the storage. Survivability of L. Plantarum in probiotic processed cheese under simulated gastric transit was lower (~80 %) as compared to MRS broth (~82%). However higher anti-oxidant and ACE inhibitory activity was observed in probiotic processed cheese digesta at final step of simulated gastric digestion in process as compared to initial bio-functional activity of PPC.

Keywords: Processed cheese, L. Plantarum, Antioxidant activity, ACE inhibitory activity, Simulated gastrointestinal digestion process

Evaluating the Impact of Training Programs on Empowering Street Vendors in Punjab: Insights from Government of India Initiatives

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ABSTRACT

Street vending is a highly versatile sector, encompassing a wide range of products and services this study determines the effectiveness of the training program on street vendors. It is a Before and After Study. Vendors from various districts of Punjab namely Ludhiana, Amritsar, Bathinda, and Jalandhar were selected who were registered in the Government of India portal, and with Punjab's Urban Local Bodies received training on several topics. Data was collected before and after structured training. During the period from June 1, 2021, to February 22, 2022, a total of 30000 street vendors registered for the training program. The participants were predominantly middle-aged, with 75.8% falling within the 30 to 60 years age range. Only 30.7% of them had completed primary school, highlighting the need for targeted training. Wilcoxon Signed Ranks Test results showed statistically significant improvements ($p < 0.05$) across most measured parameters, indicating that the intervention effectively enhanced knowledge and practices in the targeted areas. The intervention significantly improved street vendors' knowledge and practices overall. However, continuous education and targeted training programs are crucial for empowering these vendors to overcome existing challenges and enhance their business success. Addressing these needs will significantly improve street vendors' contributions to the economy

Keywords: Food and Non-Food Vendors, Intervention Effectiveness, Public Health Awareness, Skill Development Programs, Street Vendors

Assessment Of Cadmium Contamination in Packaged And Raw Bovine Milk From Budhera, Gurgaon: A Comparative Analysis

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ABSTRACT

Cadmium contamination in milk poses serious health risks, including nephrotoxicity and carcinogenic effects, making its monitoring essential for food safety. This study assessed cadmium levels in packaged and raw bovine milk samples collected from Budhera, Gurgaon, using Atomic Absorption Spectroscopy (AAS) and compared the results with national and international safety standards. A total of 30 milk samples (6 packaged and 24 raw) were assessed; revealing cadmium concentrations ranging from 0.134 to 0.148 ppm. Alarmingly, all samples exceeded the Codex Alimentarius (0.01 ppm), WHO (0.02 ppm), US FDA (0.1 ppm), and FSSAI (0.1 ppm) permissible limits, demonstrating potential health hazards. The highest contamination levels (0.147–0.148 ppm) were found in samples from the Chandu Canal area, suggesting environmental pollution as a major contributor. Comparison with previous Indian studies confirms a determined issue of heavy metal contamination in dairy products, particularly in urban and industrialized regions. The negligible difference between packaged and raw milk samples suggests contamination may occur during both production and processing. These findings underscore the urgent need for stricter dairy safety regulations, advanced purification technologies, and increased public awareness to mitigate heavy metal exposure through milk consumption. Future research should focus on bioremediation techniques, improved filtration methods, and policy-driven interventions to reduce cadmium contamination in dairy products and safeguard public health.

Keywords - Cadmium contamination, Milk safety, Packaged milk, Bovine milk, Heavy metals, Atomic Absorption Spectroscopy, Dairy safety regulations, public health, Gurgaon, India

Exploring the Impact of Goat-Cow Milk Admixtures on the Characterization and Metabolite Profile of Feta-Type Cheese

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ABSTRACT

Feta, a white, soft-ripened cheese, is one of the most renowned and traditional Greek cheeses, traditionally made from goat's milk or a combination of goat and sheep milk. With the global Feta cheese market reaching USD 11.5 billion in 2023, demand for this cheese continues to rise. However, the limited availability of goat and sheep milk poses a challenge in meeting this growing demand. To address this, exploring milk combinations from different species offers a potential solution for optimizing Feta cheese production. Results revealed that Feta cheese prepared in different combinations of G100, G70:C30, G60:C40, G50:C50, and C100 admixtures had a meltability (mm) of 1.06±0.08, 1.33±0.16, 2.45±0.90, 2.84±0.71 and 1.61±0.77, flowability (mm) of 18.00±0.00, 40.33±0.57, 100.33±17.89, 51.66±18.47 and 8.00±3.46, respectively. A gel electrophoresis and Fourier transform infrared spectroscopy technique were employed to analyse protein patterns and functional groups, revealing significant differences in protein structure between different milk admixtures. Fatty acid profiling using gas chromatography-flame ionization detection indicated notable differences in lipid composition, with goat milk-rich cheeses exhibiting a higher proportion of medium-chain and unsaturated fatty acids. Confocal laser scanning microscope demonstrated a more uniform distribution of protein and fat in formulations. Metabolite profiling of feta-type cheese using gas chromatography-mass spectrometry revealed 42 distinct metabolites, including acetic acid, lactic acid, glycerol, and various fatty acids, which play a crucial role in defining its flavor, texture, and microbial stability. Additionally, health-promoting metabolites such as oleic acid, myo-inositol, dodecanoic acid, decanoic acid, and hexadecanoic acid were identified, offering potential benefits for heart health, digestion, and metabolic regulation. These findings provide critical insights into the biochemical and structural modifications induced by admixture of milk, contributing to the optimization of Feta cheese formulation and enhancement of its nutritional properties.

Keywords: feta type cheese, protein pattern, functional groups, metaboliteS

Increasing Virulence of *Pseudomonas Aeruginosa* And Its Herbal Remedies Impacting Food Storage, Consumption & Health

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ABSTRACT

Pseudomonas aeruginosa is an opportunistic, virulent pathogen found in diverse habitats from soil, meat (fish scales), milk, vegetables, and water to hospital-borne infections. This bacterium has become resistant to multiple drugs over time and evolved its antimicrobial resistance mechanism over the period, affecting immunocompromised, NICU, immunocompetent individuals, and cystic fibrosis patients. It is one of the reasons associated with high mortality rates among such immunocompromised patients due to inhalation, or infections caused by this bacterium like ventilator-associated pneumonia, sepsis syndromes, nosocomial infections, and food poisoning, leading to its invasion, biofilm formation, and severe pneumonia. One of the significant reasons for the prevalence and virulence of this pathogen among immunocompromised patients is due to its ability to modify itself over the period. It has been observed that the virulence of this pathogen is increasing as per research in 2023, the prevalence of virulence factors associated with biofilm formation was 89.4%, and virulence genes like lasB and algD show the highest prevalence rates, i.e. 93.3% and 91.3%, respectively, contributing to high mortality rates. Since it is developing resistance to colistin, a drug used for its treatment, accentuating the requirement of other suitable herbal drugs with lesser or no side effects, thus, limiting its high mortality rates among immunocompromised patients and leading to a safer, sustainable approach towards better and safer food options and treatments for it. Further utilising it in combinational therapy with other drugs could be promising future possibilities.

Keywords: food poisoning, herbal drug, *Pseudomonas aeruginosa,* safer food options, sustainable approach

Study The Nutritional, Functional and Sensory Properties Of Millet-Based Extruded Noodles

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ABSTRACT

Millets, referred to as "coarse cereals," are increasingly recognized as "nutricereals" due to their high nutritional value. The present study aimed to develop millet-based instant noodles using different composite millet flour (0%, 25%, 50%, and 75%) blended with rice flour. The investigation evaluated the nutritional, functional, textural, cooking, and sensory characteristics of the millet incorporated noodles. The results indicated that the addition of millet flour significantly improved the nutritional composition, particularly by increasing the total ash content, crude fiber content and protein content. Similarly, the total phenolic and flavonoid contents showed an increase in free radical scavenging activity after millet flour incorporation. The amylose content was observed to be highest in the control sample (73.6%), and the resistant starch of noodles was recorded between 4.69 g/100 g to 10.12 g/100 g across various formulations. Millet noodles not only take less time for cooking but also recorded the minimum cooking losses. The sensory evaluation indicated that the noodles with 25% millet flour incorporation were highly acceptable. The findings suggest that millet-based noodles could have strong market potential and this novel millet-based product offers a healthy choice to consumers.

Keywords: Millets, Extrusion, Texture analysis, Noodles, Rice flour.

Proximate And Phytochemical Analysis of *Catharanthus Roseus* and *Ipomoea Batatas* And The Sensory Attributes Of A Developed Product

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ABSTRACT

C. roseus and *I. batatas* are recognised for their abundant phytochemical and nutritional characteristics, rendering them advantageous components for functional food applications. This study sought to evaluate the proximate and phytochemical content of *C. roseus* leaves and *I. batatas* tubers while formulating and assessing a food product that incorporates these ingredients. Standard AOAC methodologies were employed to ascertain moisture, ash, protein, fat, fibre, and carbohydrate levels, whilst phytochemical analysis evaluated phenolic and flavonoid concentrations. A functional spread based on curd was developed, integrating different concentrations of *C. roseus* and *I. batatas*. Sensory evaluation was conducted using a nine-point hedonic scale to assess appearance, texture, taste, aroma, and overall acceptability. The study indicated that *C. roseus* is a valuable source of fibre and bioactive substances, while *I. batatas* provides natural sweetness and gives texture to spread. Sensory evaluation revealed that reduced amounts of *C. roseus* enhanced acceptance, whereas *I. batatas* contributed to flavour balance. The refined formulation attained significant approval among panellists, indicating the viability of integrating these components into functional foods. This research underscores the promise of *C. roseus* and *I. batatas* in novel food innovation, providing a nutritionally enhanced, consumer-acceptable product. Further research on bioactive retention and shelf-life stability is recommended assess commercial potential.

Keywords: *Catharanthus roseus*, functional food, *Ipomoea batatas*, phytochemical, sensory evaluation

Effect Of Atmospheric Pressure Pin To Plate Cold Plasma On Physicochemical And Functional Properties Of Lesser Yam *(Dioscorea Esculenta)* Starch

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ABSTRACT

Lesser yam (*Dioscorea esculenta*) is an underutilized tuber crop with a high starch content (60–85% of dry weight), making it a promising candidate for industrial applications. However, its native starch exhibits limitations such as poor pasting properties and low thermal stability, which restrict its broader use. To enhance its functional properties, starch modification is essential. In this study, cold plasma technology a novel, non-thermal, environmentally friendly, and sustainable modification method was employed to improve the physicochemical and functional properties of lesser yam starch. Starch isolated from lesser yam was exposed to atmospheric pressure pin-to-plate plasma treatment applied at varying voltages (190, 210, and 230V) and exposure times (5, 10, and 15 min). The untreated and plasma-treated starch samples were analysed for pH, water activity, turbidity, water and oil binding capacities, pasting properties, differential scanning calorimetry (DSC), fourier-transform infrared spectroscopy (FTIR), and other characteristics. Due to the presence of highly reactive species and free radicals in cold plasma, significant modifications were observed in the starch properties. Plasma treatment resulted in a significant reduction ($p < 0.05$) in turbidity by 50% and a decrease in pH from 6.19 to 4.65. Additionally, the water and oil binding capacities increased from 2.41 to 2.94 g/g and from 2.71 to 2.93 g/g, respectively. DSC analysis revealed an increase in gelatinization enthalpy, suggesting improved thermal stability due to plasma-induced crosslinking of starch molecules. This study highlights the potential of cold plasma technology as an effective method for modifying starch, thereby enhancing its industrial applicability.

Keyword: Cold plasma, Crosslinking, Lesser yam, Starch modification

Evaluating Storage Stability of Pomegranate And Orange Juices: A Comparative Temperature-Dependent Analysis

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ABSTRACT

The quality and stability of fruit juices are significantly influenced by storage temperature. This study evaluates the impact of two storage conditions, 4°C (refrigerated) and 25°C (ambient), on the physicochemical, and sensory characteristics of packaged pomegranate and orange juices over a 90-day period. Key quality attributes, including pH, total soluble solids, total titratable acidity, ascorbic acid content, antioxidant (DPPH) assay, and sensory properties were analysed periodically. Results indicate that lower temperatures slow degradation processes such as ascorbic acid loss, and color changes. Pomegranate juice demonstrated better retention of bioactive compounds, whereas orange juice exhibited higher susceptibility to vitamin C degradation. Sensory analysis revealed that refrigerated storage better preserved flavour and appearance, leading to higher overall acceptability. These findings underscore the importance of optimal storage conditions in maintaining juice quality and extending shelf life, providing valuable insights for the food industry to improve storage guidelines.

Keywords: Fruit juice, orange juice, pomegranate juice, quality assessment, storage temperature.

Gas Chromatography-Mass Spectrometry (GC-MS) Based Fatty Acid Profiling of Algae-Enriched Chocolate Spread Emulsion: Characterization And Nutritional Implications

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ABSTRACT

This study investigates the fatty acid composition of an algae-enriched chocolate spread emulsion using Gas Chromatography-Mass Spectrometry (GC-MS) and evaluates its nutritional implications. The incorporation of algal oil, a rich source of polyunsaturated fatty acids (PUFAs), particularly omega-3 and omega-6 fatty acids, was optimized to enhance the functional properties of the spread. GC-MS analysis identified a diverse fatty acid profile, with a significant presence of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), 18.4% and 12.7% of total fatty acids, respectively. it is observed that oleic acid constitutes the highest percentage at 43.18%, followed closely by linoleic acid at 54.63%. This high content of unsaturated fatty acids is beneficial, as they are known to support heart health and provide essential fatty acids that the body cannot synthesize. Palmitic acid, while present at 14.58%, is a saturated fatty acid that can contribute to the emulsion's stability and texture. The presence of other fatty acids such as caprylic acid (1.08%), lauric acid (1.07%), palmitoleic acid (2.41%), and stearic acid (6.87%) indicates a well rounded fatty acid profile that enhanced the overall flavor and mouthfeel of the chocolate spread. The balance between saturated and unsaturated fatty acids in this emulsion suggests potential health benefits while maintaining desirable sensory attributes.

Keywords: Algal oil, Chocolate Spread Emulsion, Fatty Acid, Polyunsaturated Fatty Acid, Omega 3 Fatty Acid

Enhancing Nutritional Value of Milk and Milk Products

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ABSTRACT

In the modern era of urbanization and fast lifestyle, deficiencies related to the omega – 3 fatty acids, Iron is quite prevalent. To overcome this problem of hidden hunger, incorporation of the above – mentioned nutrients in milk can be called as a possible solution. Milk has been picked for the encapsulation as milk is being consumed worldwide by majority of the population. Hollow solid lipid microparticles (HoSoLiP) and nanoliposomes (NLs) have been developed to enhance the stability and bioavailability of omega-3 fatty acids in milk. Similarly, novel iron-ascorbate-amino acid (AsA-Fe-AmA) triple chelate complexes have been synthesized to fortify dairy products with iron, ensuring improved absorption and stability in food matrices. Apart from this, this can help us in the eradication of cognitive disorders, cardiovascular diseases, and anemia. Improved nutritional status leads to better productivity, enhanced cognitive function, and overall well-being, particularly in vulnerable populations such as children and pregnant women. However, even with such advancements, the concerns like cost of product, initial investment and sensory acceptance are needed to be taken care of. The cost concern can be countered with consideration of long – term benefits of encapsulation. The long - term benefits will help us to cut the capital consumed in the name of healthcare costs. Similarly, some research work is needed in the case of sensory acceptance in order to gain an competitive edge over the existing product.

Keywords: milk products, lipid microparticles, nanoliposomes, encapsulation

Assessing The Effect of Commercialised Formulations For Purification Of Reused Edible Cooking Oil

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ABSTRACT

Oil is a vital ingredient in Indian cooking, and reusing cooking oil is a common practice in both homes and commercial kitchens. However, when oil is reheated beyond its smoking point, it undergoes molecular changes, leading to the breakdown of unsaturated fatty acids and the formation of free radicals and trans fatty acids. These harmful compounds are linked to serious health issues like cardiovascular diseases, insulin resistance, and gut microbiome imbalance. Since oil is an expensive commodity, frequent disposal after limited use is not practical. This highlights the need for a safe and effective formulation that reduces harmful chemical compounds like free fatty acids (FFAs) and total polar compounds while also improving the oil's physical properties, such as color and viscosity.In this review, 15 research papers were screened from databases like PubMed, Google Scholar, and ResearchGate, with 10 studies selected based on specific criteria, including the treatment of edible oils reheated at least twice. At the industrial level, during the refining of reused oil, methods like FFA neutralization using sodium hydroxide (NaOH) and potassium hydroxide (KOH) are widely applied. These alkaline agents reduce FFAs through a chemical reaction called saponification, forming soap and water, which are later removed. Liquid-liquid extraction techniques are also used to lower FFA content. However, industrial materials like magnesium silicate, used to absorb impurities, and montmorillonite clay, used for decolorization, pose health risks such as interfering with drug absorption and causing respiratory issues. This study emphasizes the need for natural, food-grade alternatives to ensure the safety and quality of reused cooking oil in households and restaurants.

Keywords: edible oil, free fatty acids, oil purification, trans fats, food safety

Development and Quality Evaluation of Amaranth Incorporated of Ghee Residue Nutritious Chikki

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ABSTRACT

Chikki is a traditional Indian jaggery-based sweet known for its distinct color, texture, and flavor. This study aimed to develop amaranth roasted chikki using ghee residue and jaggery to maximize the utilization of by-products and creating a nutritious, protein-rich snack. The incorporation of ghee residue enhanced texture, flavor, and nutritional value, reducing food waste. Amaranth seeds provided fiber, healthy fats and antioxidants, promoting muscle growth, digestion and heart health. Jaggery contributed natural energy, while oleic acid and essential minerals supported cardiovascular well-being, bone health and overall vitality. Ghee residue and jaggery enhanced creaminess, binding and energy density, making the chikki a nutritious and sustainable, making it a valuable addition to the market. The jaggery syrup was concentrated to 70%, and amaranth seeds were dry roasted until aromatic. Three formulations were prepared: T1 (Ghee residue 10%, Amaranth seed 20%, Jaggery 70%), T2 (Ghee residue 15%, Amaranth seed 15%, Jaggery 70%) and T3 (Ghee residue 20%, Amaranth seed 10%, Jaggery 70%). The mixtures were heated, spread on greased plates, cooled, and stored. Based on sensory and physico-chemical analysis, T3 (Ghee residue 20%, Amaranth seeds 10%, Jaggery 70%) was the most acceptable and be used to develop a product that adversely affected the sensory attributes. The physio-chemical content of different parameters varies from fat (14.39-17.20), protein (16- 17.82), ash (5.31-6.00), total solids (89.79-96.47), moisture (3.35-10.21), carbohydrates (51.00-62.48) and oleic acid content (0.2594-0.5076), hardness (121.375N-182.457N) and the optimized chikki had a standard plate count of 10.3-18.3 with no coliform, yeast, or mold, complying with FSSAI standards. Antioxidant activity was recorded at 41.00 (mg/GAE).

Keywords: Amaranth seed, Ghee residue, Jaggery, By- product, Nutritious chikki

Organoleptic, Microbial and Physico-Chemical Evaluation Of Gut-Boosting Marmalade

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ABSTRACT

The human gut microbiota consists of more than one thousand microbial species that form a complex ecological community. The dysbiosis of the gut microbiota are known to have negative influence in the body resulting in various complex diseases, such as depression, anxiety, hypertension, cardiovascular diseases, obesity, diabetes, non-alcoholic fatty liver diseases (NAFLDs), inflammatory bowels diseases (IBDs), chronic kidney diseases (CKDs), cirrhosis of the liver, etc. Prebiotics, polyphenols, dietary fiber and anti-inflammatory foods play an important role in maintaining a positive gut environment. The aim of this study is on the formulation and development of gut friendly marmalade. Marmalade is a popular fruit preserve known for its tangy-sweet flavor and rich texture. It is made using orange (Citrus sinensis) along with its peel, complemented by grated ginger (Zingiber officinale), gooseberry (Phyllanthus emblica), mint leaves (Mentha spp.), lemon (Citrus limon), citric acid, rock sugar and Xanthan gum. The combination of these ingredients enhance the nutritional and sensory properties of the marmalade. Orange with peel is rich in pectin, polyphenols (flavonoids) and dietary fiber which supports digestion and gut microbiota as well as a gelling factor, gooseberry and lemon which are rich source of Vitamin C enhance the taste by adding acidity also aiding in preservation(self-life) along with the citric acid. Grated ginger has anti-inflammatory properties which aids digestion and reduce bloating and also adds mild pungency. The study also highlights the analysis of Brix,pH,moisture,water activity, antioxidant capacity, vitamin C,optical and rheological properties (spread ability, viscosity) on the first day of storage, and after 60 days of storage along with microbiological analyses. Moreover, a sensory evaluation was performed to assess its consumer acceptance as compared to marmalade made with sucrose. Marmalade made with healthy sweetener (rock sugar) are microbiologically more stable than marmalade made using sucrose.

Keywords: Marmalade, Gut-friendly, Orange peel, Digestive health, Anti-inflammatory, Polyphenols, Dietary Fiber.

Investigation of Stone-Like Particles In Tastemaker Seasoning: Causes And Solutions

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ABSTRACT

Consumer complaints regarding the presence of hard, stone-like particles in tastemaker seasoning of instant noodles raised concerns about product quality and potential contamination. In response, an investigation was conducted using older tastemaker samples, which were cut open to examine the reported formations. The analysis revealed that these structures were not actual stones but hardened caramelized substances. Advanced analytical techniques, including Fourier-transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC), and X-ray diffraction (XRD), were employed to determine their composition. The study found that excessive caramelization of sugar in the presence of salt during processing was the primary cause. Contributing factors included high processing temperatures, moisture fluctuations, salt recrystallization, and inadequate ingredient mixing, which promoted the formation of crystalline structures resembling stones. To prevent recurrence, implementing stricter process controls such as optimized temperature management, improved ingredient dispersion, and better storage conditions is recommended. These measures will enhance seasoning quality, ensure product consistency, and address consumer concerns effectively.

Keywords: Caramelization, Tastemaker, Salt Crystallization, Food Processing, Quality Control, Consumer Complaints

Common Quality Control Tests During Beer Production

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ABSTRACT

Quality control (QC) is a fundamental part of beer manufacture, preserving consistency, safety, and consumer acceptability. Several physicochemical analyses are performed at successive stages during brewing—raw material inspection, brewing, fermentation, maturation, and packaging—to ensure product integrity and conformity to industry norms. This research gives a summary of the most popularly applied QC analyses in the brewery industry, i.e., measurement of pH, determination of alcoholic content, determination of bitterness (IBU), colour measurement (EBC), haze analysis, measurement of dissolved oxygen, and microbiological test. Every test plays a particular function in ensuring beer quality. pH regulation guarantees correct enzymatic activity during mashing and fermentation, impacting beer flavour and stability. Alcohol content analysis, performed using alcolyzer, guarantees compliance with legal/excise requirements and consumer satisfaction. Bitterness (IBU) analysis measures hop-derived iso-alpha acids, impacting flavour balance. Colour measurement guarantees uniform appearance, impacted by malt composition. Haze tests check for clarity, avoiding haze that may be a sign of stability problems. Dissolved oxygen analysis is important in packaging since excessive oxygen can cause oxidation and spoilage. Microbiological examination, such as yeast cell count checks, avoids off flavours and product spoilage due to bacteria or wild yeast. This research, performed in Simba Brewery's Quality Assurance Laboratory, emphasises the importance of such tests in ensuring batch-to-batch consistency and avoiding defects. By following stringent quality control measures, breweries can increase shelf stability, achieve optimal flavour profiles, and comply with regulations. The results emphasise the necessity of regular testing and ongoing monitoring in providing a high-quality product to the consumer.

Keywords: Beer Quality Control, Brewing Analysis, pH Measurement, Alcohol Content, Bitterness (IBU), Haze, Microbiological Testing, Dissolved Oxygen, Quality Assurance

Food Preservation Methods – Freezing, Dehydration, And Irradiation

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ABSTRACT

Food preservation is essential for extending shelf life, maintaining nutritional value, and preventing spoilage caused by microorganisms. This paper explores three widely used preservation methods: freezing, dehydration, and irradiation. Food preservation plays a vital role in extending shelf life, maintaining nutritional value, and preventing microbial spoilage. This paper explores three primary preservation techniques: freezing, dehydration, and irradiation. Freezing is an effective method that slows microbial growth and enzymatic activity by lowering the temperature, making it suitable for long-term storage. Dehydration removes moisture, preventing bacterial and fungal growth while producing lightweight, easily transportable food products. Irradiation utilizes ionizing radiation to eliminate harmful pathogens, delay ripening, and extend freshness without significantly altering the food's taste, texture, or nutritional properties. Each of these methods has distinct mechanisms, benefits, and applications, making them essential in the food industry. Freezing preserves food quality but requires continuous refrigeration, dehydration enhances shelf stability without refrigeration but may alter texture, and irradiation improves food safety without affecting sensory attributes. Understanding these preservation techniques is crucial for optimizing food storage, minimizing waste, and ensuring a stable global food supply.

Keywords: Food preservation, freezing, dehydration, irradiation, microbial growth, shelf life, enzymatic activity, moisture removal, ionizing radiation

Haldiram's Bread: A Review on Bran and Cereal Bread and Milk Bread

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ABSTRACT

Bread is a staple food consumed globally, and its nutritional profile varies based on ingredient composition. Haldiram's, a prominent brand in the Indian food industry, has extended its product portfolio to include bran and cereal bread and milk bread. Bran and cereal bread are enriched with dietary fiber and essential micronutrients, offering numerous health benefits such as improved digestion, better glycaemic control, and reduced risk of cardiovascular diseases. In contrast, milk bread is valued for its soft texture, rich taste, and enhanced calcium and protein content, making it a preferred choice for children and general consumers. This review provides a detailed analysis of the raw materials, production processes, and quality control measures employed in manufacturing these bread types. A comprehensive evaluation of quality tests, including moisture content analysis, texture profiling, microbial load assessment, and chemical composition testing, is presented. The review also highlights consumer preferences, challenges in production, and potential advancements in bakery science to improve shelf life and nutritional value. Additionally, the differences between Haldiram's bread and those of other brands are discussed, along with a comparative analysis of bran and cereal bread, milk bread, and whole wheat bread to provide insights into their nutritional and sensory attributes. By understanding the technological aspects and market trends of Haldiram's bread products, this study aims to bridge the gap between industrial baking techniques and consumer health demands.

Keywords: Haldiram, Breads, Quality Analysis, Bran, Cereals

From Contaminated Water To Thriving Fields: Decolorization Of Dyes In Textile Effluent To Reduce Water Pollution

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ABSTRACT

This study concludes that use of microbes for textile effluent degradation is an eco-friendly approach and holds a promising approach for environmental remediation. Dyes have been used in textile industries for decades and leave a harmful impact on the water bodies, leading to soil contamination with toxins and ultimately entering the food chain. They can significantly affect plant growth, impacting germination and seedling growth. They are chemical compounds that have a chromophore core that can be either degradable or non degradable and are often harmful to the environment. The chromophore reduces the photosynthesis process by obstructing direct sunlight reaching the chloroplast. Their presence in water decreases its transparency and gas solubility. Dyes are of distinct types: natural, synthetic, azo, acid, basic, aniline, Sulphur, etc. The most studied is the azo dye, known for its toxic effects on the health of living beings. Increasing number of textile industries demand a rapid action to bioremediate the dyes present in textile effluent and is considered the most efficient option. The immobilization of bacteria is an advanced approach for the decolorization and degradation of the dye, utilizing enzymes produced by microbes. Additionally, the immobilized bacteria and the composite can be easily separated after the treatment, leaving no harmful byproducts.

Keywords: water quality, textile effluent, photosynthesis reduction, soil health, degradation

Nutritional Profiling of Germinated Black Soybean Seeds: A Proximate Analysis Approach

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ABSTRACT

Germination has been recognized as a natural process that enhances the nutritional quality, bioavailability and functional properties of legumes, including black soybean (Glycine max L.). Research indicates that it triggers enzymatic activities that break down complex macromolecules, leading to improved protein digestibility, a reduction in antinutritional factors and enhanced nutrient absorption. In this study, proximate analysis was conducted on germinated black soybean to assess moisture, ash, protein, fat, fiber and carbohydrate content. The results revealed significant changes in macronutrient composition, with an increase in protein and fiber content, making it a promising plant-based protein source. Concurrently, a reduction in carbohydrate levels was observed, suggesting potential benefits for glycemic control and metabolic health. Additionally, fat content and lipid profile were analyzed, indicating an improvement in nutritional value and functional properties. Further, research suggests that germination influences the lipid profile, contributing to enhanced functional and nutritional properties. These findings highlight the potential of germinated black soybean as a nutrient-dense ingredient suitable for functional food formulations, particularly in high-protein and plant-based diets. Its sustainability and versatility reinforce its value in the food industry. However, further investigations into its mineral bioavailability, antioxidant activity and shelf-life stability could provide deeper insights into its health benefits and broader applications in food product development.

Keywords: Black Soybean, Bioavailability, Germination, Nutritional Composition, Proximate Analysis

Risk Assessment and Management Of Food Borne Pathogens In Ready-To-Eat Foods

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ABSTRACT

The increased consumption of ready-to-eat salads outside homes because of a fast-paced lifestyle, awareness on their nutritional attributes and enhanced processing technology is well documented. This study aimed to determine the microbiological quality of fresh-cut salads vegetables in small and medium sized foodservice establishments (SMEs) and to identify risk factors and handling practices through observational assessment to investigate if an association between microbiological quality and visual assessment (inspection) scores can be established. During a 10-year inspection survey (2001–2010), a microbiological study of ready-to-eat (RTE) foods and ready-to-bake frozen pastries from 15 canteens of the university campus was undertaken to determine their microbiological quality. The cumulative study revealed that the aerobic colony counts for the RTE product groups were as follows: from 106 to 108 CFU/g for 50% of sandwiches; under the detection limit (<10 CFU/g) for 88.6% of oven baked pastries; <105 CFU/g for 86.5% of desserts oven baked; from 103 to 109 CFU/g for desserts with dairy cream. The highest mean Enterobacteriaceae counts were recorded for desserts with dairy cream. The highest percentages of foodborne pathogens were - Listeria monocytogenes and Staphylococcus aureus in desserts with dairy cream; Salmonella spp. and presumptive Escherichia coli O157 in sandwiches; Bacillus cereus in oven baked pastries. Aerobic colony counts were in the range 107–108 CFU/g for 48.8% of frozen pastries; whereas Enterobacteriaceae counts between 103 and 104 CFU/g were detected in 35.3%. Foodborne pathogens prevalences for frozen pastries were as follows: B. cereus, Salmonella spp., presumptive E. coli O157, S. aureus, L. monocytogenes. Improved sanitary conditions in the processing plants and precautionary measures are necessary for consumer protection.

Key words: Aerobic colony counts, *Escherichia coli* O157, Food borne pathogens, ready-to-eat salads

Next-Generation Food Transparency: Blockchain-Powered Real-Time Traceability For Ultimate Safety And Sustainability

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ABSTRACT

Blockchain technology has emerged as a transformative solution to enhance food safety, transparency, and sustainability in globalized supply chains, where contamination, fraud, and inefficiencies pose significant risks. This study explores how blockchain's decentralized and immutable ledger enables end-to-end traceability, minimizing risks such as counterfeiting, contamination, and regulatory non-compliance. Through a comprehensive review of blockchain applications in food supply chains, the study examines its integration with Internet of Things (IoT) sensors and Artificial Intelligence (AI) to monitor real-time parameters such as temperature, humidity, and location. The findings indicate that blockchain significantly improves food recall efficiency, reducing response times from days to minutes, while smart contracts automate compliance, ensuring adherence to food safety standards. Additionally, blockchain supports sustainability by minimizing food waste, optimizing logistics, and promoting ethical sourcing. Despite these advantages, challenges such as scalability, interoperability, and adoption costs hinder widespread implementation. Addressing these barriers requires collaborative efforts from stakeholders, regulatory bodies, and technology innovators. This research underscores the potential of blockchain-driven food traceability in revolutionizing global food security, strengthening consumer trust, and fostering a resilient and transparent food ecosystem.

Keywords: Blockchain, Food traceability, Transparency, Smart contracts

Clean To Eat: Exploring Household & Industrial Decontamination Methods For Fresh Fruits And Vegetables

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ABSTRACT

Fresh fruits and vegetables are integral to a nutritious diet, but they are also very vulnerable to contamination by pesticides, heavy metals, diseases, and other dangerous residues. Contamination can occur at various stages, including cultivation, harvesting, processing, transportation, and storage, which puts customers' health at risk. Effective decontamination methods are important to guarantee food safety, extend shelf life, and preserve the nutritional and sensory value of fresh produce. This study explores and compares different household and industrial decontamination methods used to remove contaminants from fruits and vegetables. The most common household decontamination techniques include washing with water, salt solutions, vinegar, baking soda, and commercially available produce washes. Emerging techniques such as electrolyzed water and ozone treatment are gaining popularity for their effectiveness in microbial and pesticide reduction. For large scale decontamination on industrial scale techniques like chlorine and organic acid treatments, UV-C irradiation, ozone, high-pressure processing (HPP), and cold plasma technology are widely used. These techniques vary in their effectiveness, cost, environmental impact and effects on the nutritional and sensory qualities of fresh fruit. This research evaluates the advantages and limitations of both household and industrial approaches by evaluating their efficiency in microbial load reduction, eliminating pesticide, and overall safety improvement. By providing a comparative analysis, this study aims to determine the most effective methods for guaranteeing the safety of fresh fruits and vegetables. The findings of this research can contribute to improve consumer practices and promote food safety regulations in the food sector.

Key words: High-pressure processing, Decontamination, Industrial Decontamination, Food safety regulations

Challenges And Solutions For Food Security In Developing Nations

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ABSTRACT

Food security remains a pressing challenge in developing nations, where economic instability, climate change, population growth, and inefficient agricultural practices exacerbate hunger and malnutrition. Limited access to modern farming technologies, inadequate infrastructure, and weak policy frameworks further hinder food production and distribution, deepening the crisis. Additionally, post-harvest losses, food wastage, and supply chain disruptions reduce the availability of essential nutrients, disproportionately affecting vulnerable communities. Addressing these challenges requires a multifaceted approach encompassing policy reforms, technological advancements, and international cooperation. Sustainable agricultural practices, such as precision farming, agroecology, and climate-resilient crops, can enhance food production while preserving environmental resources. Strengthening rural infrastructure, improving market access, and investing in food storage and distribution systems can mitigate food losses and enhance supply chain efficiency. Government interventions, including subsidies for small-scale farmers, public-private partnerships, and targeted nutrition programs, play a crucial role in ensuring equitable food access. Additionally, leveraging digital innovations, such as blockchain for traceability, AI-driven predictive analytics, and mobile platforms for real-time market data, can revolutionize food security strategies. Global collaborations and knowledge-sharing initiatives among nations can further accelerate progress in combating hunger and malnutrition. Ultimately, a holistic approach that integrates technological innovation, policy reinforcement, and community engagement is essential to achieving long-term food security in developing nations. By fostering resilience, sustainability, and inclusivity in food systems, the global community can pave the way for a hunger-free future.

Keywords: Climate resilience, Food security, Global cooperation, Hunger mitigation, Infrastructure development, Sustainable agriculture, Technological innovation

From Farm to Table: How Food Labels Influence Consumer Decisions

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ABSTRACT

Food labeling serves as a fundamental tool in shaping consumer choices by providing critical information regarding product ingredients, nutritional value, origin, and safety. As health consciousness and ethical consumption continue to rise, consumers increasingly rely on food labels to make informed decisions. This study examines the influence of food labeling on consumer behavior, highlighting the significance of transparency, accuracy, and regulatory compliance in ensuring public trust. The primary objective is to assess how key labeling components—such as nutritional facts, allergen disclosures, organic and non-GMO certifications, and sustainability claims—affect purchasing patterns and dietary habits. Regulatory bodies, including the FDA, EU authorities, and the Codex Alimentarius, establish labeling standards to safeguard consumer rights and prevent misleading claims. However, despite these regulations, challenges persist, such as vague terminology, marketing-driven misrepresentation, and inconsistencies in labeling practices across regions. The growing consumer preference for organic, ethically sourced, and environmentally sustainable products underscores the need for clearer and more standardized labeling systems. Additionally, advancements in digital technology, including QR codes and smart labels, are revolutionizing access to real-time product information, further enhancing transparency. Nonetheless, the effectiveness of food labeling depends not only on regulatory enforcement but also on consumer education and awareness. Strengthening policies, improving global standardization, and promoting label literacy are essential to fostering trust and enabling consumers to make healthier and more sustainable choices. This research underscores the transformative power of well-regulated food labeling in promoting informed purchasing decisions, public health, and responsible consumption.

Keywords: Allergens, Certifications, Consumer awareness, Ethical consumption, Food labeling, Informed choices, Nutrition, Public health, Regulations, Sustainability, Transparency

Edible Coating Technologies: A Solution for Enhancing Food Shelf Life and Quality

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ABSTRACT

Edible films and coatings have gained attention as sustainable packaging solutions due to their biodegradability and ability to incorporate active agents that enhance food preservation. Multicomponent edible coatings, made from various biopolymers, offer promising applications in the food industry. Their barrier properties depend on both structural composition and environmental factors. Chitosan-based coatings with calcium or vitamin E have been shown to extend the shelf life of strawberries and raspberries by reducing decay and weight loss, while boosting nutritional value. Coatings with xanthan gum on baby carrots improved calcium and vitamin E levels, enhanced surface color, and maintained sensory characteristics without altering texture. Edible coatings also act as natural antioxidant carriers, delaying lipid oxidation and improving food stability. Innovations like multilayered coating further enhance moisture and gas barrier properties, preserving freshness during storage. Additionally, byproducts from food processing, rich in biopolymers and bioactive compounds, offer sustainable packaging options with antimicrobial and antioxidant properties. Advanced, environmentally friendly coating technologies using natural, biodegradable materials provide effective means for extending fruit shelf life, reducing spoilage, and decreasing reliance on conventional preservation methods. This paper provides an overview of the recent developments in utilizing edible coatings for prolonging the food shelf-life and quality.

Keywords: Edible films; Food preservation; Biodegradable materials; Natural antioxidants; Shelf-life; Food processing.

Evaluation Of Different Types of Oils Used For Frying In Snack Industry: A Review Based Exploration

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ABSTRACT

Snacking is the most common social activity throughout the world. The snack manufacturing industry is now becoming a key food industry throughout the world. Snacking has a dual impact on human health. It helps in controlling hunger and may help reduce excess calorie intake. On the other hand, it can lead to obesity, diabetes, cardiovascular diseases and hypertension, if consumed uncontrollably and prepared with unhealthy ingredients. The present review aims to highlight the impact of oils used for frying snacks on human health. Frying is a predominant cooking method in the snacks industry, significantly influencing the texture, taste, and overall quality of snack products. The choice of frying oil plays a critical role in these aspects, as well as in determining the nutritional profile and shelf life of the final product. This review paper provides an in-depth evaluation of various oils used for frying in the snacks industry, focusing on their nutritional properties and health benefits. The study highlights the key factors influencing oil selection, such as oxidative stability, smoke point, and the propensity for fat absorption during frying, which directly impacts product quality and consumer perception. A comparative analysis of commonly used frying oils - palm oil, cotton seed oil, rice bran oil, corn oil - reveals variations in their suitability based on frying temperature, oil longevity, and health implications. Hence, the review aims to provide a valuable insight into the optimization of oil selection for improving product quality, nutritional content, and sustainability in the industry’s evolving landscape.

Keywords: Frying oils, Health impact, Nutritional properties, Oil absorption, Snack manufacturing

Advancing Plant Proteins: The Role Of Non-Thermal Modification Techniques In Structural And Functional Enhancement

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ABSTRACT

Protein is one of a major and versatile component in food. Apart from its significance in nutrition, the structural and functional properties of proteins play a significant role in determining the quality of the final food product. Novel non-thermal modification technologies can be used to alter plant proteins, therein, improving its structural and functional properties which can partly or wholly used as plant-based meat-alternative. The aim of this review study was to compare and identify optimal non-thermal plant protein modification techniques. Studies has shown that non-thermal treatment at high intensities can cause unfolding and aggregation of protein molecules. It also changes the composition of hydrophobic and hydrophilic end, in turn, improving protein's solubility, water-binding capacity, foaming and emulsifying capacity. It also leads new bonds formation causing conformational changes in the secondary, tertiary, and quaternary structures of plant proteins. Non-thermal modification technique can also reduce allergenicity component in pulse proteins without affecting its bioactivity and organoleptic qualities. This review study discusses about the potential advantages and limitations of non-thermal modification techniques on plant protein structural properties and functionality.

Keywords- plant protein modification, non-thermal techniques, structural properties, functional properties

Review on Biosensors As Pathogen Sensors In Food Packaging For Real-Time Contamination Detection

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ABSTRACT

Foodborne pathogens remain a major global health threat, causing millions of illnesses annually. Traditional food safety approaches, such as microbial culture tests and expiration labels, lack real-time detection capabilities, increasing the risk of contamination and foodborne disease outbreaks. In response, biosensors integrated into food packaging have emerged as a transformative technology, enabling rapid, sensitive, and on-site pathogen detection to enhance food safety and reduce waste. Biosensors function by utilizing biological recognition elements such as antibodies, aptamers, nucleic acids, and enzymes that selectively bind to pathogen-associated molecules. This interaction generates a measurable signal, which varies depending on the sensor type. Optical biosensors detect fluorescence or colorimetric shifts upon pathogen presence, while electrochemical biosensors measure conductivity or impedance changes caused by microbial metabolism. These sensors provide real-time contamination alerts, eliminating the need for laboratory-based microbiological testing. The integration of biosensors into smart packaging enables proactive food quality monitoring across various sectors. In meat and dairy products, biosensors can identify spoilage bacteria like E. coli and Salmonella by tracking toxin levels and metabolic activity. In seafood, they monitor histamine accumulation, a key indicator of bacterial degradation. Fresh produce packaging can incorporate biosensors that detect ethylene gas fluctuations or microbial contamination, preventing the sale of compromised fruits and vegetables. By facilitating real-time detection, biosensors represent a paradigm shift in food safety, ensuring quicker response times and reducing the distribution of contaminated food. Additionally, these sensors promote sustainability by allowing consumers and retailers to assess food freshness dynamically rather than relying on static expiration dates.

Keywords: Biosensors, Food Packaging, Pathogen Detection, Smart Packaging.

Consumer Trends And Market Insights In Breakfast Cereals

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ABSTRACT

The breakfast cereal industry is evolving to meet changing consumer demands for health-conscious, sustainable, and innovative products. Growing interest in clean-label, organic, and functional cereals has led to reformulations with higher fiber, protein, and probiotics while reducing sugar and artificial additives. Trends like plant-based, gluten-free, and keto-friendly options are reshaping the market, alongside sustainability efforts in packaging and sourcing. This study explores key market shifts, regional preferences, and future directions, highlighting how the industry adapts to evolving consumer expectations.

Keywords: Consumer trends, breakfast cereals, fibre rich, protein

Recent Development In Antimicrobial Packaging

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ABSTRACT

The demand for minimally processed foods is increasing as consumer preferences shift toward healthier and more natural food options. However, these foods are highly susceptible to microbial contamination, which can lead to spoilage and safety concerns. To address these issues, antimicrobial packaging has been introduced as an advanced food preservation method. This type of active packaging incorporates antimicrobial agents that help inhibit the growth of harmful microorganisms, ensuring food safety and extending shelf life. Various antimicrobial packaging techniques include the integration of active compounds into sachets, films, and coatings. Natural antimicrobial substances, such as essential oils, plant extracts, and bacteriocins, are gaining popularity due to their effectiveness and consumer demand for fewer synthetic additives. However, the effectiveness of antimicrobial packaging is often challenged by the weak mechanical and barrier properties of biodegradable films. To overcome these limitations, nanotechnology offers solutions such as nano-reinforcements and nanoencapsulation, enhancing the stability and controlled release of antimicrobial agents. Despite these advancements, potential concerns regarding the environmental impact of nanomaterials need to be addressed. Selecting the most suitable antimicrobial packaging system depends on several factors, including food type, storage conditions, and regulatory requirements. This review explores different antimicrobial packaging methods, their applications in fresh produce, dairy, and meat products, and the role of nanotechnology in improving food preservation. By extending shelf life and minimizing contamination risks, antimicrobial packaging presents a valuable innovation for the food industry, contributing to both safety and sustainability.

Keywords: Antimicrobial packaging, active packaging, food preservation, food safety, natural antimicrobials, nanotechnology, sustainable packaging, shelf-life extension.

Quality Control And Safety In Dairy Processing

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ABSTRACT

The dairy enterprise plays a crucial role in providing important nutrients to consumers worldwide, but making sure pleasant control and protection in dairy processing is paramount due to the perishable nature of dairy merchandise and their susceptibility to contamination. This abstract explores the key factors of nice control and safety protocols in dairy processing, specializing in products, microbial control, packaging improvements, and regulatory compliance.These Effective quality control measures, along with risk analysis and critical manage factors (HACCP), appropriate manufacturing Practices (GMP), and advanced microbial trying out, assist in retaining product integrity and stopping foodborne illnesses. additionally, technological improvements like automation, actual-time monitoring, and AI-pushed first-rate evaluation are improving efficiency and protection requirements within the dairy quarter.The look at also highlights rising challenges, such as cold chain logistics, antibiotic residues, and adulteration, which effect dairy nice and purchaser trust. implementing sustainable and innovative packaging answers similarly contributes to extending shelf lifestyles whilst keeping freshness and dietary price.Ensuring strict adherence to global food protection policies, together with those set by the food protection and standards Authority of India (FSSAI), the U.S. meals and Drug management (FDA), and the European food protection Authority (EFSA), is essential for enterprise growth and consumer safety. In conclusion, strong fine manipulate structures, technological innovations, and regulatory frameworks are vital for preserving the safety, hygiene, and dietary great of dairy merchandise. future advancements in smart sensors, blockchain for traceability, and AI-based predictive analytics will in addition revolutionize dairy processing, making sure better standards of protection and efficiency.

Keywords: Perishable nature, HACCP, GMP , AI- driven quality assessment, FSSAI

Review On Biosensors As Pathogen Sensors In Food Packaging

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ABSTRACT

Foodborne pathogens remain a major global health threat, causing millions of illnesses annually. Traditional food safety approaches, such as microbial culture tests and expiration labels, lack real-time detection capabilities, increasing the risk of contamination and foodborne disease outbreaks. In response, biosensors integrated into food packaging have emerged as a transformative technology, enabling rapid, sensitive, and on-site pathogen detection to enhance food safety and reduce waste. Biosensors function by utilizing biological recognition elements such as antibodies, aptamers, nucleic acids, and enzymes that selectively bind to pathogen-associated molecules. This interaction generates a measurable signal, which varies depending on the sensor type. Optical biosensors detect fluorescence or colorimetric shifts upon pathogen presence, while electrochemical biosensors measure conductivity or impedance changes caused by microbial metabolism. These sensors provide real-time contamination alerts, eliminating the need for laboratory-based microbiological testing. The integration of biosensors into smart packaging enables proactive food quality monitoring across various sectors. In meat and dairy products, biosensors can identify spoilage bacteria like E. coli and Salmonella by tracking toxin levels and metabolic activity. In seafood, they monitor histamine accumulation, a key indicator of bacterial degradation. Fresh produce packaging can incorporate biosensors that detect ethylene gas fluctuations or microbial contamination, preventing the sale of compromised fruits and vegetables. Several companies are leading the development of biosensors for pathogen detection in food packaging. SwissDeCode specializes in DNA-based rapid detection kits, while NanoSpy develops graphene-based electrochemical biosensors. By enabling real-time detection, biosensors revolutionize food safety by ensuring faster responses and minimizing the spread of contaminated food. Additionally, these sensors support sustainability by allowing consumers and retailers to evaluate food freshness in real time, rather than depending on fixed expiration dates.

Keywords: Biosensors, Food Packaging, Pathogen Detection, Smart Packaging.

Shelf Life & Stability Studies of Chocolate Enrobed Apricot Confection

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ABSTRACT

The purpose of this study is to analyse the shelf life of a chocolate-enrobed confection fortified with apricot using Response Surface Methodology (RSM) and Central Composite Design (CCD). The impact of storage temperature (ambient and refrigerated) and period (upto 180 days) on the moisture, appearance, peroxide value and sensory characteristics of developed confection was studied.The impact of storage temperature (ambient & refrigerated) and period (180 days) on Yeast & Mould and TPC was studied. At both ambient and refrigerated storage product was not significantly deteriorate but Confection with refrigerated storage was the most stable and showed less deviation in moisture,peroxide value , appearance and sensory characteristics. The condition of samples stored at ambient temp started to slightly deteriorate in sensory characteristics after 120 days of storage; the decline was observed mainly in taste due to an off-note developed by slightly high peroxide value, resulting in low overall acceptability. TPC and yeast & mould count were absent till 120 days and after 180 days was 10<CFU. Moisture sorption studies were conducted at a controlled humidity of 20%,40%,50%,70%,80%,90% ,the developed confection was most stable at 40% and less stable at 70-90%. This paper is focused on the impact of storage conditions on apricot confection .Refrigerated temp was the most suitable for confection storage and its acceptability . Confection was found most stable at 40% Humidity .

Keywords: Apricot- enrobed Chocolate Confections, Moisture isotherm, Shelf-stability studies, microbiological analysis

Impact of Packaging on the Shelf Life of Food Product: A Review

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ABSTRACT

This review article explores the multifunctional functions of packaging in prolonging the shelf life of food products. Besides physical protection of packaging against environmental conditions of moisture, oxygen, and light, packaging also plays a proactive role in ensuring food integrity by inhibiting microbial development and chemical degradation. The abstract combines research on conventional packaging materials such as plastic and glass and new green alternatives such as biodegradable polymers and advanced packaging systems. The focus is on smart and active packaging technologies that incorporate antimicrobial additives and sensors with responsive mechanisms for monitoring and limiting spoilage. The current review explores how these innovations improve barrier properties and environmental interactions and hence increase product life and address issues of safety and sustainability. The discussion also investigates regulatory, economic, and environmental drivers for changes in packaging technologies in the food sector. Future research directions are suggested, and the potential of using nanotechnology and sensor technologies to design more reactive and sensitive packaging systems is discussed. Generally, the paper provides an extensive review of the interface between packaging innovations and food preservation with actionable insights for academic researchers and industry practitioners interested in enhancing food quality and minimizing waste along the supply chain.

Key words: shelf life, food regulations, food waste, biodegradable polymers

Preventing microbial cross-contamination in food handling: a comprehensive review

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ABSTRACT

Cross-contamination in food handling is a critical concern in ensuring food safety and preventing foodborne illnesses. This study explores the various pathways through which cross-contamination can occur, including direct contact between raw and cooked foods, improper handling of utensils and equipment, and inadequate personal hygiene practices. It also emphasizes the importance of implementing robust food safety protocols, such as proper handwashing, the use of separate cutting boards for raw and ready-to-eat foods, and regular sanitization of surfaces and tools. Additionally, the role of employee training in fostering a culture of food safety is highlighted, as well as the need for clear labelling and storage practices to prevent mix-ups. The study also discusses the impact of cross-contamination on vulnerable populations, such as children, the elderly, and immunocompromised individuals, underscoring the necessity of stringent preventive measures. By integrating scientific research with practical guidelines, this study aims to provide actionable strategies for food handlers, businesses, and regulatory bodies to minimize the risk of cross-contamination. Ultimately, the findings advocate for a proactive approach to food safety, combining education, technology, and policy to safeguard public health and maintain consumer trust in the food supply chain.

Keywords: Cross-contamination, food handling, food microflora

Production and quality analysis of Spices

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ABSTRACT

The production and quality of spices play a vital role in the food, pharmaceutical, and cosmetic industries, ensuring flavour, nutritional value, and safety. Spice production involves cultivation, harvesting, processing, and packaging, with each stage influencing the final product's quality. Factors such as soil conditions, climate, and agricultural practices impact spice yield and composition. Post-harvest handling, including drying, grinding, and storage, must be carefully managed to prevent contamination, loss of essential oils, and microbial growth. Quality assurance is critical, requiring adherence to good agricultural practices (GAP), good manufacturing practices (GMP), and hazard analysis and critical control points (HACCP) guidelines. Advanced testing techniques such as chromatography, spectroscopy, and microbiological analysis help detect adulterants, heavy metals, and pesticide residues. Regulatory compliance with international food safety standards ensures consumer safety and market acceptance. This paper discusses the key aspects of spice production and quality control, highlighting the need for stringent monitoring and technological advancements.

Key words: Spice Production, Quality Assurance, Regulatory Compliance

THEME 6
HARNESSING NANOBIOLOGY FOR AGRI-FOOD TECHNOLOGY

Biopolymer Based Strategy For Enhanced Survival And Controlled Release Of Plant Growth-Promoting Bacteria (PGPR) Under Environmental Stress: A Way Towards Sustainable Agriculture

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ABSTRACT

Using a progressive release approach based on encapsulation technology is thought to be an effective way to deliver and store beneficial microorganisms known as Plant growth promoting bacteria. Under varied stress conditions, PGPR plays as a role in enhancing plant health and growth. Regretfully, environmental variables and temperature cause bacterial viability to decline. Several encapsulation techniques have been developed by scientists to improve the effectiveness and survivability of biocontrol agents. Bacteria encapsulation produces a layer that resembles a wall that regulates the release of microorganisms, shields them, and ensures their capacity to function. The key to creating bacterial inoculants is to adopt novel formulations and calculate the survival rate of the bacteria This work introduces a novel formulation that improves their survivability and effectiveness in harsh environmental settings. In this study, alginate and starch were combined to encapsulate PGPR, utilizing an ionic gelation- biopolymer approach. The impact of the biopolymer to bacteria mass ratio on the encapsulation process, morphological & bioactivity features of encapsulated bacteria have been thoroughly investigated. According to the results, the swelling behavior and liquid content increased as the starch and alginate concentration did, since 1.5% gelatin concentration was found to have the highest encapsulation efficiency i.e. 91.83% and bacterial release, and this concentration was taken into consideration when mixing it with 2% alginate for encapsulation. This formulation, which is more effective for plants and is based on encapsulation, seems to be a potential method of delivering PGPR in soil.

Keywords: Encapsulation, Biopolymers, PGPR, Encapsulation efficiency

Nanoencapsulation Of Indole-3-Acetic Acid (IAA): A Sustainable Innovation for Targeted Delivery In Agriculture To Enhance Food Security, Plant Health, And Stress Resilience

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ABSTRACT

In the current scenario of global food security challenges, we need to adopt innovative agricultural practices that enhance crop resilience and productivity. Integrating nanotechnology with biotechnology offers a promising approach to improving the efficiency of agricultural inputs while maintaining environmental sustainability. Indole-3-acetic acid (IAA) is a naturally occurring plant hormone which plays critical roles in plant development and stress mitigation. However, the effectiveness of IAA is limited by degradation and inefficient delivery to target sites. To overcome this, we encapsulated IAA in biocompatible chitosan nanoparticles, to achieve controlled release and targeted delivery, for enhancing efficiency with minimal input. The nanoformulations were prepared by encapsulating various concentrations of IAA ranging from 1-10 mg in chitosan NPs. The encapsulation efficiency (EE) was high for all concentrations evaluated, ranging from 93-96%, with loading efficiencies (LE) increasing at higher concentrations (>10%). Further characterization of the synthesized formulations will be carried out for additional studies. The study demonstrated successful preparation of nanoencapsulated IAA. The high EE and the increased LE highlight the effectiveness of the nanodelivery system. Further characterization will refine these formulations, and the selected concentration will be tested on plants to assess its potential for stress mitigation and growth enhancement. This study supports development of sustainable agricultural and food practices through improved plant growth regulation.

Keywords: IAA, chitosan NPs, controlled release, food security, Nanoencapsulation

Impact Of Salinity Stress on Wheat Production: A Growing Concern of Food Security For The Growing World Population

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ABSTRACT

Plants are exposed to various abiotic stresses that negatively impact their growth, metabolism, and productivity. Salinity is one of the most grievous abiotic stresses which affect most of the plant production globally. Salinity stress poses a significant threat to global food production, with its severity steadily increasing due to human activities. Wheat (Triticum aestivum L.) as a key staple food and a primary source of carbohydrates for the majority of the people all across the globe. . However, wheat productivity adversely affected by salinity stress which associated with the reduction in growth parameters, photosynthesis pigment, chlorophyll fluoresence of wheat seedlings leading to diminished grain yield and quality. Also, due to salinity stress in wheat reduced the hormonal imbalance, enzymatic activity, oxidative stress and yield reduction. However, salinity stress at the reproductive stages can also decreases the productivity of the crops. This brings an alarming concern of wheat production in saline soils due to its decline in the crop productivity and yield and therefore impacting the food security of the nation. Hence, will discussed the impact of salinity stress in wheat plants, potential mechanisms for coping with salinity stress, and management strategies to enhance wheat performance in saline environment.

Keywords: food security, salinity stress, wheat, productivity

Zinc Nanoparticles Modulate Arsenic Absorption and ROS Scavenging, Which Are Key Components of Arsenic And Nacl-Mediated Cross Tolerance Processes In Rice

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ABSTRACT

In addition to being a significant barrier to crop productivity, soil contamination with arsenic (As) and salinity (NaCl) has posed a substantial threat to plant growth and development patterns. The growth parameter, photosynthesis performance, nutrient content, biochemical, and molecular attributes, as well as the quality of the crop, are all drastically changed and decreased when As and NaCl are applied alone. However, when As and NaCl are applied together, the morphological parameter, biochemical, and molecular attributes increase because of the cross tolerance between As and NaCl. Nevertheless, ZnONPs (25µM) are crucial in preventing the toxicity caused by As and NaCl cross tolerance in rice crops. ZnONPs prevented the detrimental effects of As and NaCl by limiting their entry, potentially through the involvement of NO in the rice plants' roots. Additionally, compared to As toxicity, As significantly decreased the gene expression of proline metabolism and NO (*OsNoA1* and *OsNIA1*) and ROS scavenging, while NaCl lowered these genes less, hence reducing oxidative stress in rice crops. The cross tolerance between Arsenic (As) and NaCl-mediated toxicity in rice (*Oryza sativa*) crops is the main topic of this work. Maintaining agricultural output in As and NaCl stress plants in contaminated areas worldwide will be greatly aided by the findings of this study. The findings offer fresh perspectives on the environmentally friendly uses of nanotechnology in farming.

Keywords: Arsenic, food quality, food security, salinity, stress

Hydrogen Sulfide and Titanium Dioxide Nanoparticles Work Together to Relieve Tomato Seedlings' Stress From Salt.

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ABSTRACT

A significant agricultural issue, salinity stress affects all essential plant functions, such as photosynthesis, cellular metabolism, and nutrient intake. This study investigates the effects of titanium dioxide nanoparticles (TiO2NPs) on the physiological, biochemical, and molecular traits of tomato seedlings in response to salinity. Under both normal and salt-stressed conditions, TiO2NPs (100 µM) significantly improved all these parameters, including shoot-root length and shoot-root fresh mass, while salinity stress (150 mM, sodium chloride) significantly reduced all these parameters of the tomato seedlings. Additionally, by preserving levels of carotenoids, chlorophyll a, chlorophyll b, and total protein, TiO2NPs improved photosynthetic efficiency. They also reduced oxidative damage by lowering the accumulation of reactive oxygen species (ROS) and altered important enzymatic antioxidants (APX, GR, MDHAR, and DHAR), ascorbate-glutathione, nitrogen, sucrose metabolism, nutrient homeostasis, and antioxidant gene expression. However, when endogenous hydrogen sulfide (H2S) biosynthesis was inhibited using DL-propargylglycine (PAG), the protective effects of TiO_2NPs were diminished against salt stress, indicating that endogenous H2S may be involved in the amelioration of salinity stress mediated by TiO_2NPs. Additionally, supplementing with an H_2S donor (NaHS, sodium hydrosulfide) not only counteracted the effects of PAG but also lessened the unfavorable effects of salinity stress, suggesting that H2S buildup brought on by external supplementation may benefit tomato seedling growth. This discovery highlights the potential use of TiO_2NPs and H_2S to improve plant resilience by offering important insights into their synergistic interplay in plant responses to salinity stress.

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***Keywords**:* Food security, Hydrogen sulfide, Nanoparticle, Nitric oxide, Nutrient, Salinity, Sucrose, Titanium

On the NO_2 Sensing Characteristics of SnO_2 Thin-film based Gas Sensors

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ABSTRACT

Portable gas sensors are preferred for the detection, measurement and monitoring of specific chemical gases in various industries. In food industry, combustion of fossil fuels, various industrial processes including manufacturing process and food product refining can generate NO_2. Therefore, continuous detection and monitoring of this toxic gas becomes important. In this work the gas sensing characteristics of SnO_2 thin film has been investigated for NO_2. The SnO_2- thin films are synthesised by a simple process which involved deposition of Sn metal by DC sputtering followed by post-oxidation. The thickness of deposited Sn film is 75 nm. Post-oxidation of Sn film was done by direct oxidation at the temperature of 850ºC with a constant ramp up rate of 10ºC/min with a holding time of 1 h. The structural characterization was performed by x-ray diffraction, the SnO_2 thin film exhibit polycrystalline, tetragonal rutile structure. The scanning electron microscopy reveals the granular surface morphology of SnO_2 thin film. The NO_2 gas sensing measurements were performed at low temperature from RT to 150ºC. The highest sensitivity of the material was found to be 58.51% and 73.15% for 10 ppm NO_2 at room temperature and 100ºC, respectively. The obtained results will be discussed in detail.

Keywords: Gas Sensor, Metal Oxide, Scanning Electron Microscopy, Thin Film, X-ray Diffraction

Impact Of Copper and Iron Nanoparticles on Photosynthetic Pigments and Stomatal Frequency of Rice Plant

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ABSTRACT

The study related to the impacts of nanoparticles on crops has emerged as a significant area of focus within the field of plant science research. In light of this, the present research has been carried out to investigate the influence of Copper (CuNps) and Iron (FeNps) nanoparticles on rice (*Oryza sativa*). The findings of the current research revealed that the application of FeNps and CuNps at different concentration differentially influence the membrane damage and lipid peroxidation while promoting the repair of damaged tissues. Further, photosynthetic pigments like total chlorophyll and carotenoids were also enhanced due to the exposure of both the NPs. On the contrary, the application of FeNps and CuNps at a certain concentration resulted in a significant reduction in growth parameters, chlorophyll content, and stomatal density of rice seedlings. In conclusion, the results of this study demonstrate that elevated levels of FeNps (500 µM) and CuNps (100 µM) negatively affect rice seedlings by inducing oxidative stress, leading to a decline in growth metrics, lower chlorophyll concentrations, and a reduction in stomatal frequency. In comparison, the administration of FeNps and CuNps at lower concentrations i.e. 25 µM and 15 µM, respectively, imparts protective effects on rice seedlings against oxidative stress and mitigates the accumulation of Iron and Copper in the root system, thereby giving a positive effect on structural integrity on both root and shoot tissues of the rice plant.

Keywords: Copper nanoparticles (CuNps), Chlorophyll content, food safety, Iron nanoparticles (FeNps), Rice (*Oryza sativa*), Stomatal frequency.

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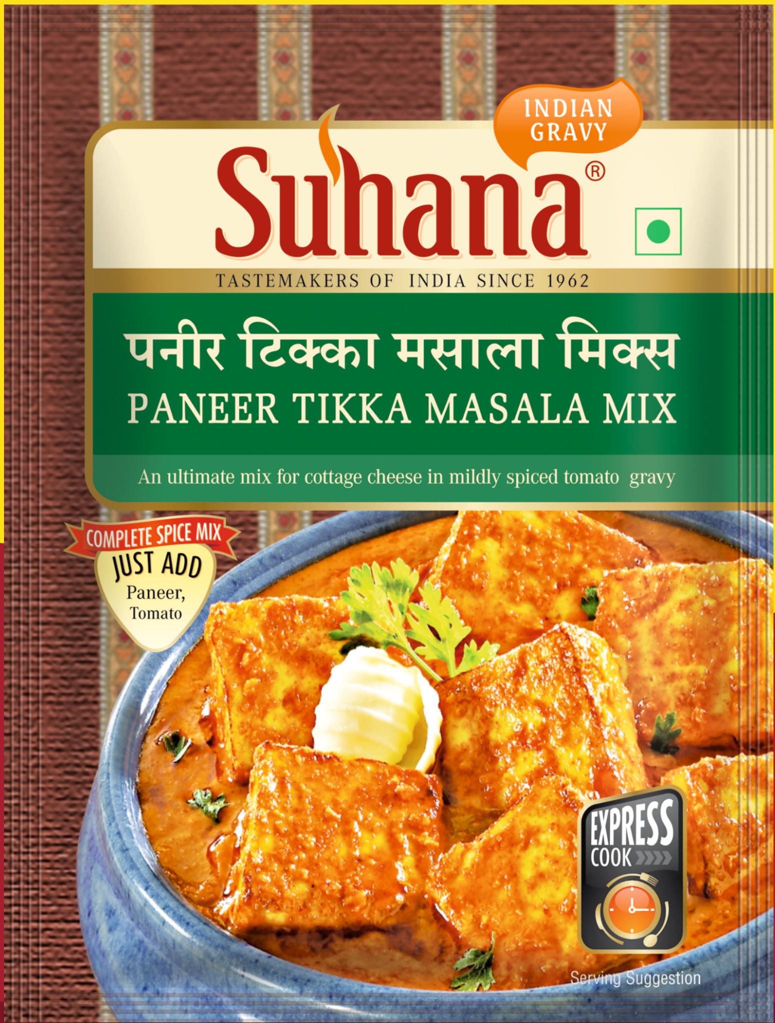

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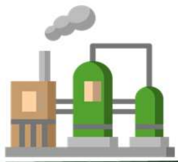

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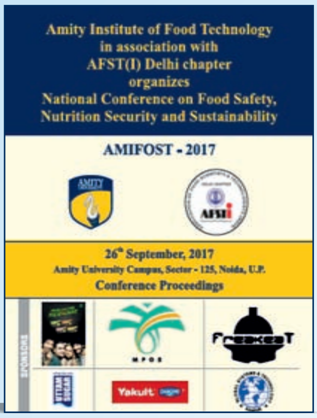

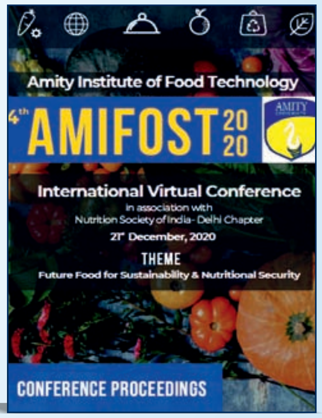

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