

CRITERION III – RESEARCH, INNOVATIONS AND EXTENSION

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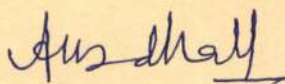
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PREFACE

It is my pleasure to welcome you to the proceedings of the Nutraceutical World Conference, a forum for discussion and exchange of ideas on the latest research and developments in the field of nutraceuticals. This conference brings together experts from academia, industry, and government to share their knowledge and insights on this rapidly evolving field. The term "nutraceutical" refers to a broad range of products that are derived from food sources and are believed to have health benefits beyond their basic nutritional value. These products include dietary supplements, functional foods, and beverages, as well as other natural products that are used to promote health and prevent disease. Over the past few decades, nutraceuticals have become increasingly popular, as people seek natural ways to maintain and improve their health. As a result, the market for nutraceuticals has grown rapidly, and there has been a corresponding increase in research into their efficacy and safety.

This conference provides a unique opportunity to hear from experts in the field, learn about the latest advances in research and network with colleagues from around the world. We hope that the proceedings of this conference will be a valuable resource for researchers, practitioners, and policymakers, as they work to develop and promote the use of nutraceuticals to improve human health.

We would like to express our gratitude to all the participants, sponsors, and organizers who have made this conference possible. We look forward to a productive and stimulating meeting, and we hope that you will find this conference's proceedings informative and useful.



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Nutraceutical industries worldwide: a brief outline

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Introduction to the Nutraceutical Industry

The nutraceutical industry has been experiencing rapid growth in recent years and is expected to continue to do so in the future. According to a report by Grand View Research, the global nutraceuticals market size was valued at USD 382.51 billion in 2019 and is expected to grow at a compound annual growth rate (CAGR) of 8.3% from 2020 to 2027 (GNMGAP Report 2020-27).

The United States is currently the largest nutraceutical market in the world, with a market size of USD 77.3 billion in 2020. Europe is the second-largest market, followed by Japan and China. The Asia-Pacific region is expected to see the highest growth in the nutraceutical industry, with a CAGR of 8.9% from 2021 to 2028 (Corp et al., 2021).

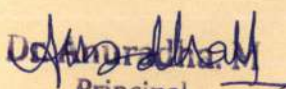
The nutraceutical industry is highly regulated, with different countries having varying regulatory frameworks. In the United States, nutraceuticals are regulated as dietary supplements under the Dietary Supplement Health and Education Act (DSHEA) of 1994. In Europe, nutraceuticals are regulated as food supplements under the European Food Safety Authority (EFSA) (Polonikov A., 2020).

Despite the regulatory challenges, the industry has attracted numerous key players. Some of the top companies in the nutraceutical industry include Nestle, Amway, Herbalife, GNC Holdings, and PepsiCo, among others (Corp et al., 2021).

Nutraceuticals are gaining popularity for their potential to prevent and treat specific health conditions. For example, omega-3 fatty acid supplements are used to lower the risk of heart disease, while probiotics are used to improve digestive health (Polonikov A., 2020).

The increasing demand for natural and organic products, as well as the growing trend towards preventative healthcare, is also driving the growth of the nutraceutical industry.




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An Introduction to the Nutraceutical World

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Introduction

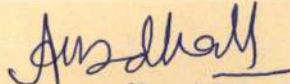
Opportunities in Nutraceuticals – A Futuristic Food trends for a healthy life:

The field of nutraceuticals offers vast opportunities for research, development, and commercialization, with potential to prevent and treat chronic diseases and address global health issues (Lobo et al., 2010; Miglio et al., 2019). Advancements in technology and biotechnology are also driving the production and delivery of nutraceuticals, and personalized nutrition can lead to customized nutraceutical products (BCC Research, 2021; Gibson et al., 2020). Moreover, the increasing demand for plant-based and vegan diets can drive the development of plant-based nutraceuticals, which are gaining popularity (Grand View Research, 2021). Additionally, nutraceuticals have the potential to improve mental health and cognitive function, offering a promising market (Ossoukhova et al., 2019).

In terms of futuristic food trends for a healthy life, there is a growing interest in plant-based foods, probiotics, and fermented foods, which have beneficial effects on gut health (BCC Research, 2021). Functional foods, which have been enhanced with added nutrients or bioactive ingredients to provide specific health benefits, are also becoming more popular (Li et al., 2019). Moreover, there is a trend towards locally sourced and sustainable foods, which can reduce carbon emissions and support local communities (Das and Raychaudhuri, 2020). Personalized nutrition, enabled by technology and genomics, is also gaining traction (Ghosh et al., 2019).

Overall, the opportunities in nutraceuticals and futuristic food trends for a healthy life are diverse and vast, offering potential for new and innovative products with health benefits. By leveraging advancements in technology and biotechnology, nutraceuticals can be tailored to meet the needs of individuals and address global health challenges. As people become increasingly conscious about their health and the environment, there is a growing demand for plant-based, sustainable, and personalized food products.




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Nutraceuticals from animal sources: a review of current research and future prospects

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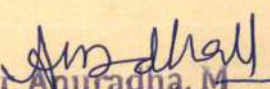
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Introduction

Nutraceuticals are a class of bioactive compounds that are derived from food sources and are believed to have potential health benefits beyond their basic nutritional value (Kitts and Weiler, 2003). The global nutraceuticals market has been growing rapidly in recent years due to increasing consumer demand for natural and functional ingredients (Grand View Research, 2021). Nutraceuticals have been shown to have a variety of health-promoting properties, including antioxidant, anti-inflammatory, and anti-cancer effects (Yashin *et al.*, 2018). Moreover, nutraceuticals are considered to be a cost-effective and safe alternative to traditional drugs, as they are generally considered to have fewer side effects (Di Lorenzo *et al.*, 2020). Animal-derived nutraceuticals have gained significant attention due to their unique properties and potential therapeutic effects (Dhanasekaran *et al.*, 2021). These nutraceuticals can be sourced from a variety of animal products, including meat, fish, dairy, and eggs, and contain a diverse range of bioactive compounds, such as proteins, peptides, amino acids, fatty acids, and minerals (Das and Raychaudhuri, 2020). Research into the health benefits of animal-derived nutraceuticals is expanding, and there is growing interest in their potential applications in the food and pharmaceutical industries (Ghosh *et al.*, 2019). Overall, nutraceuticals from animal sources have the potential to be a valuable source of innovative functional ingredients for improving human health (Li *et al.*, 2019).

Nutraceuticals are a class of bioactive compounds that are derived from food sources and have potential health benefits beyond their basic nutritional value (Shahidi & Ambigaipalan, 2018). Nutraceuticals from animal sources, including meat, fish, dairy, and eggs, contain a diverse range of bioactive compounds, such as proteins, peptides, amino acids, fatty acids, and minerals, that have been shown to exhibit various health-promoting properties (Pimentel *et al.*, 2018). These properties include antioxidant, anti-inflammatory, and antihypertensive effects, as well as potential benefits for cognitive function and cardiovascular health (Wu *et al.*, 2019).




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Emerging Trends in Nutraceuticals

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Introduction


Growing concern for health and fitness has led to the readiness of individuals to spend money on health supplements resulting in the rapid growth of nutraceuticals and the functional food market in the world (Verma, *et al.*, 2010). Nutraceuticals are the food components that contribute for the significant therapeutic effects on wellness (Dillard & German 2000). Several research studies have suggested the potential role of nutraceuticals in the prevention of coronary heart diseases, cancer, osteoporosis, diabetes mellitus, Parkinson's, and Alzheimer's diseases, etc., (Silvia *et al.*, 2005). Nutraceuticals include a wide range of bioactive derivatives like phytochemicals, essential oils, fatty acids, amino acids, vitamins, minerals, prebiotics, probiotics, etc., (Das *et al.*, 2012). Nutraceuticals can be derived from several natural sources like medicinal plants, spices, nuts, vegetables, microorganisms, marine organisms, etc., (Kalra, 2003).

The nutraceuticals market can be segmented broadly into dietary supplements, functional food, and beverage. The global nutraceuticals market size was valued at USD 454.55 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 9.0% from 2021 to 2030 (www.Grandviewresearch.com).

More broadly, nutraceuticals can be classified into two groups Potential nutraceuticals and Established nutraceuticals. Established nutraceuticals are products that have sufficient clinical data for health benefits otherwise they are branded under the potential nutraceutical category. Nonetheless, a larger group of nutraceutical products are still placed under potential category. An individual's susceptibility to any particular disease largely depends upon genetic predisposition and lifestyle disorders and hence the response towards the nutraceuticals varies from person to person (Pandey, Verma & Saraf 2010).

The current review attempts to present the encouraging results about the potential role of nutraceuticals in addressing various physio pathological complications such as diabetes, obesity, atherosclerosis, cardiovascular diseases, cancer, and neurological disorders.




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Entrepreneurship opportunities in Nutraceuticals

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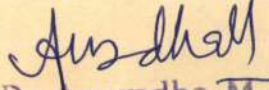
Introduction

The global nutraceutical market has been growing rapidly and is projected to reach \$578.23 billion by 2027, driven by increasing consumer awareness of the link between diet and health, the rise in chronic diseases, and the demand for preventive healthcare (Grand View Research, 2021). This growth has created a range of entrepreneurship opportunities in the nutraceutical industry. The nutraceutical industry has been growing rapidly in recent years, with consumers becoming more health-conscious and interested in alternative forms of medicine. This trend has created exciting entrepreneurship and marketing opportunities in the nutraceuticals space.

Entrepreneurship in the nutraceutical industry involves identifying unmet needs, developing innovative products and services, and leveraging emerging technologies to address health concerns. This paper aims to identify and analyze the entrepreneurship opportunities in the nutraceutical industry and provide insights into how entrepreneurs can tap into this growing market. This paper provides insights on the nutraceutical industry, highlighting the current trends and opportunities for entrepreneurs. It then identifies key entrepreneurship opportunities in the nutraceutical industry, including developing new products, online retail, customized nutrition, and plant-based products. The paper concludes by discussing the importance of innovation, digital marketing, and emerging trends for entrepreneurs seeking to succeed in this growing market.

Recent studies have shown that the nutraceutical market is projected to continue growing in the coming years due to increasing health concerns and the demand for preventive healthcare (Grand View Research, 2021; Zion Market Research, 2021). This growth has attracted the attention of entrepreneurs, who are seeking to capitalize on the market opportunities presented by the nutraceutical industry. Therefore, understanding the entrepreneurship opportunities in the nutraceutical industry is crucial for both practitioners and researchers interested in this field.




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Wealth from Waste: Utilization of Fish and Prawn Waste to Produce Nutraceuticals

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Introduction

Nutraceuticals are bioactive compounds that are derived from food sources and have health-promoting properties beyond their basic nutritional value. Nutraceuticals are often defined as "foods, or parts of foods, that provide medical or health benefits, including the prevention and/or treatment of a disease" (Stephen DeFelice, 1998) They are typically derived from natural sources, such as plants, animals, or microorganisms, and can include a wide range of compounds, such as vitamins, minerals, antioxidants, and phytochemicals (Singh and Aggarwal, 2008)

They can be considered as a bridge between food and medicine, as they possess the potential to prevent or treat a range of chronic diseases, including diabetes, cancer, and cardiovascular diseases. Nutraceuticals have been shown to have a range of health benefits, including reducing the risk of chronic diseases such as heart disease, cancer, and diabetes (Brijesh et al., 2015) They can also help to maintain overall health and wellness by supporting the immune system and promoting healthy aging (Jafari and Jafari 2016).

Fish and prawn waste is a significant source of nutraceuticals, such as chitin and chitosan, which have been shown to have a range of biological activities, including antimicrobial, antioxidant, and anti-inflammatory properties. Fish and prawn waste, which includes the shells and other parts of these seafoods that are typically discarded, can be a valuable source of nutraceuticals such as chitin and chitosan (Usman et al., 2016). Chitin is a polysaccharide that is found in the exoskeletons of crustaceans, while chitosan is a derivative of chitin that has been shown to have a range of biological activities, including antimicrobial, antioxidant, and anti-inflammatory properties (Sashiwa and Noda 2003).



Bioactive compounds from Black Pepper (*Piper nigrum*) for antimicrobial therapy

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Introduction

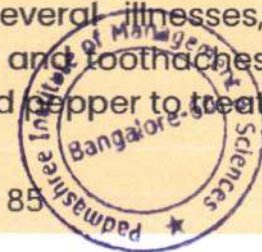
Piper nigrum, also known as black pepper and is known as the "King" of spices, is a member Piperaceae family. The fruit of *Piper nigrum*, also called pepper is an ancient and famous spice. *Piper nigrum* is native to Malabar in India, find its uses and has its uses in the treatment of cholera, constipation, arthritis, dyspepsia, and anti-periodic malaria fever (Hammouti *et al.*, 2019).



Fig 1: Seeds of Seeds of *Piper nigrum*

Piper nigrum is a common type of *Piper* having high economic, commercial and medical importance. The genus *Piper* has rich phytochemistry and researchers show a sufficient presence of alkaloids, amides and terpenoids (Parmar *et al.*, 1997).

Like many eastern spices, pepper was historically both a seasoning and a traditional medicine (Thanissaro *et al.*, 2008). Black pepper (or perhaps long pepper) was believed to cure several illnesses, such as constipation, insomnia, oral abscesses, sunburn, and toothaches, among others (Jack *et al.*, 2004). Various sources suggested pepper to treat eye problems. Several



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Nutrigenomics of Pomegranate

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Introduction

Punica granatum L. (Pomegranate) is a fruit-bearing deciduous shrub or small tree that belongs to the family of Punicaceae. It is an antioxidant rich fruit and has been considered "a pharmacy unto itself" by the Ayurvedic medicine.

Aim of the Study:

To gain insights into the complete metabolic potential of this plant; whole nuclear genome was sequenced for the first time combining the sequence data from 3 libraries corresponding to two NGS platforms.

Work flow:

1. Estimation of Nuclear DNA Content of the Leaf From *Punica granatum* "Bhagwa" Variety by Flow Cytometry
2. Isolation of Genomic DNA From the Leaves of the *Punica granatum* "Bhagwa" Variety
3. Library Preparation and Whole-Genome Sequencing
4. Raw Data Processing and In Silico Genome Size Estimation
5. De Novo Hybrid Assembly of the Nuclear Genome of *P. granatum*
6. Qualitative Analysis of De Novo *P. granatum* Draft Genome Assembly
7. Nuclear Genome Annotations
8. Identification of Transposable Elements
9. Prediction of Microsatellites
10. Gene Annotations
11. Comparative Genomic Analysis Between Pomegranate and Other Plant Species
12. Phylogenetic Tree Based on Average Nucleotide Identity Analysis
13. Identification and Analysis of the Variants in *P. granatum* Genome

*Extended work flow can be found at Usha et al, 2022



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Microgreens and nutraceutical benefits

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Introduction

Microgreens are young and tender plants harvested at the cotyledon stage, the first true leaf stage of a plant's development. They are considered a superfood due to their high nutritional value and potential health benefits.

Microgreens are the seedlings of edible plants that are harvested within 7 to 21 days of germination, depending on the plant variety. They are typically 1-3 inches tall and grown in soil or substituted using natural or artificial light. (Xiao *et al.*, 2012).

Microgreens have been cultivated for centuries in Asian cuisine, where they are commonly used in soups, salads, and garnishes. The practice of growing microgreens as a commercial crop began in the United States in the 1990s and has since gained popularity worldwide. (Dias *et al.*, 2018).

Microgreens have been found to contain high levels of vitamins, minerals, and antioxidants compared to their mature counterparts. They are also a rich source of dietary fiber, protein, and phytochemicals. Regular consumption of microgreens has been linked to several health benefits, including improved digestion, reduced risk of chronic diseases, and enhanced immune function (Wang *et al.*, 2020).

The nutritional content of microgreens

Microgreens are a rich source of vitamins, minerals, and phytonutrients, making them a popular choice for health-conscious individuals. A study by Xiao *et al.*, (2012) analyzed the nutrient content of 25 commercially available microgreens and found that they contained higher levels of vitamins and minerals than their mature counterparts.



Development of encapsulated lactase-enriched frozen dairy products to mitigate lactose intolerance

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Abstract

Lactose is a disaccharide consisting of galactose bound to glucose and is present in milk and its products. Lactose intolerance is a pathophysiological condition. It occurs due to insufficiency of the enzyme lactase (β -galactosidase). It is essential for the hydrolysis of lactose. 75 % of the global population is estimated to suffer from the same. Ingestion of milk and milk products like ice cream and yogurt leads to alteration in intestinal digestion and colonic fermentation, leading to diarrhea and other clinical discomforts. Presently the only solution for people with lactose problems is adherence to foods without lactose or lactase supplements. Following a lactose-free diet for a lifetime can cause nutritional imbalance and pose a health risk. This work aims to resolve the issue of incorporating immobilized lactase enzymes in ice cream. The organoleptic properties and in vitro digestibility studies of the product are studied. The results indicated the possibility of enrichment of encapsulated lactase in frozen dairy products.

Keywords encapsulated lactose, intolerance, β - galactosidase

Introduction

An enzyme is derived from an organism or cell culture, and it catalyzes the metabolic reactions in living organisms and substrate conversions in various chemical reactions (Jakub Zdarta *et al.*, Jesionowski *et al.*). Enzymes are well-known as highly effective and efficient catalysts of different processes characterized by high selectivity and activity.

The enzymes are the potential catalyst that works in mild temperature, pressure, pH, and substrate specificity under suitable reaction conditions and for producing desired products without any intermediate products as contaminations.



In silico study of antifungal activity of *Senna alata* with *Aspergillus fumigatus*

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Abstract

Senna alata is a medicinal herb of the Leguminosae family. It is found in wet and tropical areas. In folk medicine, several *Senna alata* components have been described as curative agents for treating a range of illnesses and infections. The prodrug component of various illnesses can be identified through in silico research. Based on the findings of this investigation, it was hypothesized that Aloe - Emodin, Anthrol, Luteolin, Kaempferol, Limonene, and Gallic Acid have good binding effects on Cyp51B *Aspergillus* (target protein). This can be researched further through *in vivo* and preclinical testing for additional validation.

Keywords *Senna alata*, Antifungal effect, Molecular docking

Introduction

Since ancient times, therapeutic plants, often known as medicinal herbs, have been identified and employed in traditional medical procedures. Numerous chemical compounds are created by plants for a variety of purposes, including defense against insect, herbivorous, and mammalian illnesses (M. Ekor, 2013).

There are still many people who use traditional medical systems. Increased focus on using plant materials as a source of medicines for a wide range of human disorders is the result of factors such as population growth, insufficient drug supply, expensive cost of treatments, and side effects of various synthetic therapies for infectious diseases (R. Verpoorte, 2015).

Leguminosae is a family of plants that includes the therapeutic herb *Senna alata*. It is mentioned in folk medicine as a treatment for a variety of illnesses and infections. Typhoid, diabetes, asthma, ringworm, tinea infections, scabies, blotch, herpes, and eczema were among the traditional conditions it was used to cure (A. Liuet al., 2009). Numerous conidia of this fungus are continuously inhaled by both humans and animals. In immunocompetent hosts, these conidia are typically eliminated by innate immune mechanisms.

Identification and phylogenetic profiling of ligands from probiotics

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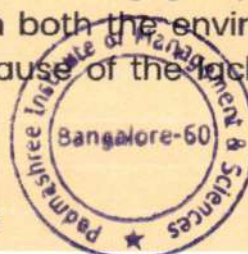
Abstract

Probiotics have been used in the food industry to produce fermented food products with health benefits. *Lactobacillus* sp., *L. acidophilus*, *Saccharomyces cerevisiae*, and *Bifidobacterium* sp., are the most widely used microbe species in the food industry as well as the health sector. The potential use of bacteriocins-producing strains as probiotic and bioprotective agents has recently received increased attention among researchers. Apart from bacteriocins, probiotic bacteria produce enzymes (amylase, β galactosidase, superoxide dismutase, catalase), vitamin (Vitamin B1, B2, B6, B9, B12, folate, amino acids (lysine, arginine, tryptophan, tyrosine), oligosaccharides, short-chain fatty acids (lactic acid, butyric acid, propionic acid, acetic acid) and various immunomodulatory compounds. Bacteriocins have several important functions such as directly inhibiting several competing strains of pathogens, or modulating the composition of the microbiota and influencing the host immune system. In the present investigation, we focused our study on an important molecule produced by probiotic organisms.

Keywords Probiotics, Bacteriocin, Microbiota

Introduction

Microorganisms make up a large part of the planet's living organism and play a vital role in maintaining the Earth's ecosystem since its origin. They are microscopic organisms that exist as unicellular, multicellular or cell clusters. They are dividing into six major types: bacteria, archaea, fungi, protozoa algae, and viruses. Bacteria are unicellular and prokaryotic organisms. They are divided based on shape: bacillus (rod-shaped), coccus (spherical), spirilla (spiral), and vibrio (curved). Most of the bacteria have a cell wall consist of peptidoglycan. According to their cell wall structure stain, they can be classified as grampositive and gram-negative. And further divided based on their response to oxygen into the following groups: aerobic, anaerobic, and facultative anaerobes (can live in both the environment). Archaea are quite different from true bacteria because of the lack of peptidoglycans in their cell wall.



Nutraceutical wine preparation from *Garcinia cambogia*

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Abstract

Nutraceuticals are substances containing biologically active compounds such as vitamins, minerals, and phytochemicals that offer potential health benefits beyond basic nutrition. *Garcinia Cambogia* is a tropical fruit commonly used in naturopathy for potential weight management and metabolic benefits. Its active ingredient, hydroxy citric acid (HCA), has been shown to suppress appetite, inhibit fat production, improve glucose metabolism and insulin sensitivity, and reduce LDL ("bad") cholesterol levels, among other potential health benefits.

Nutraceutical wine from *Garcinia cambogia* is fortified with biologically active compounds, including HCA, as they are water-soluble to enhance its potential health benefits. The wine is prepared by boiling *Garcinia cambogia* fruits with sugar and water, fermenting the mixture with wine yeast for 1-2 weeks, and then bottling it for storage. Potential health benefits of the wine include antioxidant, anti-inflammatory, and cardioprotective effects due to its high levels of total phenolic compounds, flavonoids, and anthocyanins.

Keywords *Cambogia, wine, Hydroxy Citric Acid(HCA)*

Introduction

Nutraceuticals are a rapidly growing area of interest in the food and beverage industry due to their potential health benefits beyond basic nutrition. These substances contain biologically active compounds, such as vitamins, minerals, and phytochemicals, that may offer various health benefits (Srinivasan K, 2005).

Garcinia Cambogia is a nutraceutical, important tropical fruit that has gained attention in recent years for its potential health benefits. It contains hydroxycitric acid (HCA), which has been shown to have anti-obesity, anti-inflammatory, and anti-diabetic effects (Ohia et al., 2002).



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Development of Nutraceutical Biscuits Incorporating Jackfruit Seed and Horse Gram: Physical, Sensory, and Nutritional Evaluation

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Abstract

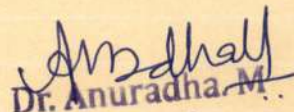
This study was aimed at the development and evaluation of nutraceutical biscuits incorporated with jackfruit seed flour and horse gram. The biscuits were formulated with varying levels of ingredients to optimize their nutrient content and sensory attributes. Glycemic and lipidemic responses were evaluated in human volunteers to assess the biscuits. Sensory evaluation was also performed to determine their acceptability and preference. Nutritional analysis was conducted to determine the nutrient and bioactive compound content of the biscuits. The study provided insights into the development of functional foods that can improve health outcomes and promote healthy eating habits. The results can be used for development of nutraceutical products and offer a potential solution for the underutilized jackfruit seeds and horse gram.

Keywords Nutraceutical Biscuits, Jackfruit, Glycemic & Lipidemic responses

Introduction

The jackfruit tree (*Artocarpus heterophyllus Lam.*) is a drought-resistant and easy-to-grow tree that produces the largest tree-borne fruit in the world. It is native to parts of south and southeast Asia and is believed to have originated in the rainforest of the Western Ghats of India. The fruit is highly nutritious and has health benefits, and the leaves make good cattle feed. The seeds, which are rich in starch and protein, are consumed fresh or processed into canned products (Purseglove, 1993). The seeds have health benefits like anticancer, antihypertensive, antiaging, antioxidant, and antiulcer properties when cooked (Vijayakumar et al, 2015). The seeds can also be used to prepare various food products. India, which is the second biggest producer of jackfruit, does not utilize this resource fully which has the potential to encourage cottage and small-scale industries, providing entrepreneurship and employment opportunities.




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***Borassus flabellifer* and its nutraceutical benefits:
A critical review**

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Borassus flabellifer, also known as the palmyra palm, is a tropical tree found in parts of Asia and Africa. The sprouts of this tree have been studied for their potential health benefits and can be considered nutraceutical. *Borassus flabellifer* sprouts are a rich source of nutrients, including vitamins, minerals, and antioxidants. They are also high in dietary fiber, which can help to promote digestive health and may reduce the risk of chronic diseases such as heart disease and type 2 diabetes. In addition to their nutrient content, *Borassus flabellifer* sprouts contain bioactive compounds, such as phenolic acids and flavonoids, which have been shown to have potential health benefits. Studies have suggested that these compounds may have anti-inflammatory, antioxidant, and anticancer properties. Overall, while more research is needed to fully understand the potential health benefits of *Borassus flabellifer* sprouts as a nutraceutical, early studies suggest that they may have promising health benefits and could be a valuable addition to a healthy diet. Tatinungu fiber has been studied for its potential health benefits, including its ability to improve digestive health by promoting regularity and reducing constipation. It is also believed to have prebiotic properties, which means that it can help to support the growth of beneficial bacteria in the gut.



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Extraction of Food colour from Bougainvillea flowers

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Bougainvillea flowers can be used to create a potent food colorant that can add a vibrant pink-to-red color to the food. To extract the color, in the present study flowers are collected shade dried, and subjected to aqueous extraction. The aqueous extract is then vacuum dried and stored for using it as a food colour. The aqueous extract exhibited very good antioxidant properties which are stable at pH 3-7. The coloring pigment of Bougainvillea flowers is reported to be betalains and betacyanins. However, it's important to note that while bougainvillea flowers are non-toxic and commonly used in traditional medicine, there are some potential risks associated with ingesting large quantities of the plant, such as gastrointestinal issues. Therefore, it's important to use in moderation when using bougainvillea flowers as a food colorant. There is a future scope for this research, which can focus on the isolation of coloring principles and yield enhancement for commercial usage. Pure betacyanin and betalains can be used as food colorants after conducting toxicology studies.



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**Comparative Review of *Melia azadirachta* and
Azadirachta indica important medicinal trees**

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Bougainvillea flowers can be used to create a potent food colorant that can add a vibrant pink-to-red color to the food. To extract the color, in the present study flowers are collected shade dried, and subjected to aqueous extraction. The aqueous extract is then vacuum dried and stored for using it as a food colour. The aqueous extract exhibited very good antioxidant properties which are stable at pH 3-7. The coloring pigment of Bougainvillea flowers is reported to be betalains and betacyanins. However, it's important to note that while bougainvillea flowers are non-toxic and commonly used in traditional medicine, there are some potential risks associated with ingesting large quantities of the plant, such as gastrointestinal issues. Therefore, it's important to use in moderation when using bougainvillea flowers as a food colorant. There is a future scope for this research, which can focus on the isolation of coloring principles and yield enhancement for commercial usage. Pure betacyanin and betalains can be used as food colorants after conducting toxicology studies.



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Development of Nutraceutical Chocolate with Brahmi Extract for Cognitive Health

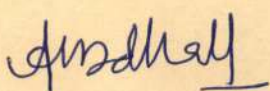
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Nutraceuticals are functional foods that provide health benefits beyond basic nutrition. Chocolate is a popular food with various health benefits due to its high content of cocoa flavonoids. Brahmi (*Bacopa monnieri*) is a well-known herb used in Ayurveda for cognitive health. The objective of this study was to develop nutraceutical chocolate containing Brahmi extract to enhance cognitive function. The chocolate was prepared using cocoa powder, sugar, milk powder, and Brahmi extract. The product was evaluated for its physicochemical, sensory, and functional properties. The chocolate containing Brahmi extract showed good physicochemical properties and sensory acceptability. The product also exhibited antioxidant activity and neuroprotective effects. Nutraceutical chocolate with Brahmi extract has the potential to provide cognitive health benefits and can be a promising functional food for consumers looking for natural ways to enhance their cognitive function.




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***Leptedenia reticulata*: A Critical Review on Nutraceutical Properties**

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Leptedenia reticulata is a medicinal plant widely used in traditional medicine for its various health benefits. In recent years, it has gained attention as a potential nutraceutical due to its diverse bioactive compounds. This review critically evaluates the nutraceutical properties of *Leptedenia reticulata*, including its antioxidant, anti-inflammatory, anti-cancer, and immune-boosting effects. The review also examines the phytochemical composition of *Leptedenia reticulata* and its potential applications in the food and pharmaceutical industries. The findings of this review suggest that *Leptedenia reticulata* has promising nutraceutical properties and warrants further research to fully understand its potential health benefits.



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Yogurt with natural sweetener and beta carotenes

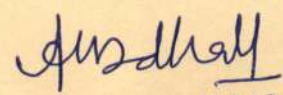
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This study proposes the use of natural sweeteners and carotenes as a healthier alternative to conventional yogurt. Conventional yogurt typically contains added sugars and artificial sweeteners, which can contribute to health problems such as obesity and diabetes. Natural sweeteners, such as honey, maple syrup, or non-calorific sugars from stevia can be used to sweeten yogurt without the negative health effects of added sugars. Additionally, carotenes, which are plant-based pigments found in fruits and vegetables, can be added to yogurt for their health benefits. Carotenes have been shown to have antioxidant properties and can help protect against certain types of cancer and heart disease. This study suggests that yogurt manufacturers should consider using natural sweeteners and carotenes to create a healthier product for consumers. Consumers can also make their own yogurt at home using natural sweeteners and adding carotenes for an even healthier option. The use of natural sweeteners and carotenes in yogurt can provide a healthier alternative to conventional yogurt and help consumers make more informed decisions about their food choices.




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***Momordica cybellaria*: A Potent Antidiabetic Plant**

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Diabetes is a growing health concern worldwide, and natural remedies are increasingly being sought after as alternative treatments. *Momordica cybellaria*, also known as the wild bitter gourd, has been traditionally used as a medicinal plant for its anti-diabetic properties. This review article summarizes the current knowledge on the antidiabetic potential of *Momordica cybellaria*. The plant contains various bioactive compounds such as charantin, momordicin, and vicine, which have been shown to have hypoglycemic effects. These compounds can enhance insulin sensitivity, promote glucose uptake, and regulate glucose metabolism in the body. Several studies have been conducted on the anti-diabetic properties of *Momordica cybellaria*, both in animal models and human trials. Results have shown that the plant has significant antidiabetic effects and can lower blood glucose levels.

Furthermore, *Momordica cybellaria* has been found to have other beneficial effects such as anti-inflammatory, antioxidant, and antimicrobial properties. These properties can help to prevent complications associated with diabetes, such as oxidative stress, inflammation, and infections. *Momordica cybellaria* is a promising plant for the treatment and management of diabetes. Its various bioactive compounds and beneficial properties make it a potent natural remedy that can help to regulate blood glucose levels and prevent diabetes-related complications.



Ashwini

Exploring the Feasibility of Ice Cream Preparation using Beet Root and Shankhapushpi Flower Extract

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Ice cream is a popular dessert enjoyed by people of all ages worldwide. However, conventional ice cream is often high in fat, sugar, and artificial flavors, making it an unhealthy choice for many consumers. To address this issue, we have explored the feasibility of preparing ice cream using natural ingredients such as beetroot and Shankhapushpi flower extract. Beetroot is a rich source of antioxidants, fiber, and essential minerals, while Shankhapushpi flower extract has been traditionally used for its medicinal properties. In this study, we have optimized the formulation of beetroot and Shankhapushpi flower extract-based ice cream using a central composite design. The physical, chemical, and sensory properties of the ice cream were evaluated using standard methods. The results indicate that the ice cream prepared using beetroot and Shankhapushpi flower extract had significantly lower fat and sugar content and higher antioxidant activity compared to conventional ice cream. Moreover, the sensory evaluation revealed that the beetroot and Shankhapushpi flower extract-based ice cream had a pleasant taste and texture, indicating its potential as a healthier and tastier alternative to conventional ice cream.



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Memory-Boosting Soup Prepared with *Centella asiatica* and Millets: A Nutritious and Delicious Recipe

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Memory loss and cognitive decline are common concerns among aging adults, and a balanced diet rich in essential nutrients can help maintain brain health. In this study, we explore the feasibility of preparing a memory-boosting soup using *Centella* and millet, two ingredients known for their cognitive-enhancing properties. *Centella*, also known as Gotu Kola, is a herb commonly used in traditional medicine to improve memory and concentration, while millets are gluten-free grains that are high in fiber, protein, and essential minerals. We have developed a recipe for a delicious and nutritious soup using these two ingredients and other wholesome foods. The soup is easy to prepare, and the ingredients are readily available. We have evaluated the nutritional composition of the soup using standard methods and found that it is rich in essential vitamins, minerals, and antioxidants. Moreover, the soup is low in fat and cholesterol, making it an ideal food for individuals with cardiovascular concerns. We have also conducted a sensory evaluation of the soup, which indicates that it has a pleasant aroma, taste, and texture. Our findings suggest that the memory-boosting soup prepared with *Centella* and millet is a tasty and nutritious way to support brain health and cognitive function.



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Healthy jam for your wellness: Nutraceutical jam Made with Bhel fruit and natural gelling agent

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This poster introduces a nutraceutical jam recipe made with bhel fruit and natural gelling agents. Nutraceuticals are foods that offer health benefits beyond their basic nutritional value, and bhel fruit is a perfect example of such a food. This fruit is known for its high nutritional content, including antioxidants, fiber, and vitamins. By combining bhel fruit with a natural gelling agent such as chia seeds or agar agar, you can create a delicious and nutritious jam that is free from artificial additives and preservatives. This article provides a step-by-step guide to making nutraceutical bhel fruit jam, as well as tips for customizing the recipe to suit your taste preferences. The jam can be enjoyed on its own, or used as a healthy alternative to sugar-laden jams and spreads. With its unique flavor and health benefits, nutraceutical bhel fruit jam is a must-try for anyone looking to improve their overall wellness.



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Sustainable protein source: edible protein extraction from silkworm pupal waste

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This poster deliberates the potential of silkworm pupal waste as a sustainable source of edible protein. Silk production generates significant amounts of waste, including silkworm pupae, which are typically discarded. However, these pupae are rich in protein, making them an attractive source for protein extraction. The presentation outlines a process for extracting edible protein from silkworm pupal waste, including protein isolation, purification, and characterization. The extracted protein can be used as a food ingredient or supplement, providing a valuable source of protein for humans. The benefits of using silkworm pupal waste as a protein source include reducing waste and providing an alternative to traditional protein sources, such as meat and dairy, which have a significant environmental impact. This also discusses the potential challenges associated with using silkworm pupal protein, such as palatability and acceptance by consumers. The use of silkworm pupal waste as a sustainable protein source has promising potential for addressing food security and sustainability challenges.



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Nutra jelly preparation with ingredients of Chywanprash

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A recipe for a nutra jelly that is made using ingredients commonly found in Chyawanprash is prepared. This is an herbal jam that is made with ingredients of Chyawanprash traditionally used in India to support overall health and well-being. The nutra jelly is a delicious and convenient way to incorporate the benefits of Chyawanprash into your diet. Various ingredients used in Chyawanprash, such as amla (Indian gooseberry), ghee (clarified butter), and honey, which are all known for their nutritional and medicinal properties are combined with gelatin or agar-agar to create a jelly that is easy to consume and digest. The nutra jelly is a great source of antioxidants, vitamins, and minerals, and is an effective way to boost your immune system, improve digestion, and promote overall health. The article provides step-by-step instructions on how to make the jelly at home, along with tips for customizing the recipe to suit your taste preferences. By incorporating the power of Chyawanprash ingredients into a delicious and convenient nutra jelly, this recipe offers a simple and effective way to improve your health and well-being.



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Exploring the Nutraceutical Benefits of Watermelon Rind

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Watermelon (*Citrullus lanatus*) is a delicious and refreshing fruit that is widely consumed all over the world. While the juicy red flesh of watermelon is well-known for its nutritional value, the rind, which is often discarded, is also a rich source of bioactive compounds that offer various health benefits. This comprehensive review aims to explore the nutraceutical benefits of watermelon rind, highlighting its potential role in preventing and managing various chronic diseases. Watermelon rind is a good source of dietary fiber, vitamins, minerals, and antioxidants. It also contains phytochemicals such as citrulline, lycopene, and cucurbitacin, which have been shown to possess anti-inflammatory, anti-cancer, anti-diabetic, and anti-hypertensive properties. Additionally, watermelon rind extract has been found to have hepatoprotective, nephroprotective, and neuroprotective effects. In conclusion, watermelon rind is a promising source of bioactive compounds that can offer various health benefits. Incorporating watermelon rind into the diet or using it as a supplement may be a simple and effective way to improve health and prevent chronic diseases. Further research is needed to explore the full potential of watermelon rind as a nutraceutical



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Exploring the Antioxidant Properties of Grapefruit Waste: A Review

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Grapefruit (*Citrus paradisi*) is a popular citrus fruit known for its sweet and tangy flavor and high nutritional value. The production of grapefruit generates a significant amount of waste, which is usually discarded as a by-product. However, recent research has shown that grapefruit waste, including peels, seeds, and pulp, contains a variety of bioactive compounds with potent antioxidant properties. This review aims to explore the antioxidant properties of grapefruit waste and its potential as a source of natural antioxidants. Grapefruit waste contains a variety of antioxidants, including flavonoids, carotenoids, and vitamin C. These compounds have been shown to scavenge free radicals, reduce oxidative stress, and protect cells from damage. Grapefruit waste extracts have also been found to have antimicrobial and anti-inflammatory properties, making them potentially useful for various health applications. Several studies have investigated the potential of grapefruit waste as a source of natural antioxidants for food and pharmaceutical industries. Grapefruit waste extracts have been used as food additives and preservatives, and in the formulation of functional foods and nutraceuticals. In addition, grapefruit waste extracts have shown promise as natural ingredients in skincare and cosmetic products. Grapefruit waste is a promising source of natural antioxidants with potential applications in various industries. Further research is needed to explore the full potential of grapefruit waste extracts and to develop efficient and sustainable extraction methods. The utilization of grapefruit waste can not only reduce waste production but also provide valuable health benefits and economic opportunities.



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Development of nutraceutical chocolate incorporating Mulberry fruit: physicochemical, sensory, and nutritional evaluation

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Mulberry fruit is a rich source of bioactive compounds such as phenolics, flavonoids, and anthocyanins, which have been reported to have several health benefits. In this study, a nutraceutical chocolate formulation was developed by incorporating mulberry fruit powder to enhance its nutritional value. The physicochemical, sensory, and nutritional properties of the nutraceutical chocolate were evaluated. The addition of mulberry fruit powder significantly increased the total phenolic and flavonoid contents of the chocolate. The chocolate also showed good sensory properties, with no significant differences in taste, texture, and overall acceptability compared to the control chocolate. The nutraceutical chocolate had a higher antioxidant activity than the control chocolate, as determined by DPPH radical scavenging assay. Furthermore, the nutraceutical chocolate had higher amounts of vitamins and minerals, including calcium, iron, and vitamin C. Overall, the incorporation of mulberry fruit powder in chocolate can provide an innovative way to increase the nutritional value of chocolate while maintaining its sensory properties. This study suggests that nutraceutical chocolate can be a promising food product for health-conscious consumers.



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Development of Nutraceutical Papad with Moringa Leaf and Horse gram

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Papad, a popular Indian snack, is a crispy, wafer-thin disc made from pulses or lentils. In this study, we aimed to develop a nutraceutical papad enriched with the goodness of moringa leaf and horse gram. Moringa leaf is a rich source of vitamins, minerals, and antioxidants, while horse gram is known for its high protein and fiber content. The papad was prepared by mixing the dough of black gram flour, rice flour, and salt with the powdered moringa leaf and horse gram. The mixture was then rolled into thin discs and sun-dried. The nutrient content of the prepared papad was analyzed for protein, fiber, vitamins, and minerals. Sensory evaluation was conducted to determine the acceptability of the developed product. The results of nutrient analysis showed that the developed papad contained a significant amount of protein, fiber, and minerals, including calcium, iron, and zinc, which are essential for overall health. The sensory evaluation results revealed that the developed papad was highly acceptable, with a crisp texture and unique flavor. In conclusion, the developed nutraceutical papad with moringa leaf and horse gram is a healthy and delicious snack that can provide several health benefits. It can be incorporated into the daily diet to meet the nutritional needs of individuals.



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Nutraceutical benefits of chia seeds: A critical review

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Chia seeds, derived from the plant *Salvia hispanica* L., have gained popularity in recent years as a functional food due to their potential health benefits. Chia seeds are rich in dietary fiber, protein, omega-3 fatty acids, antioxidants, and various minerals. In this critical review, we aim to provide an overview of the nutraceutical benefits of chia seeds based on scientific evidence. Several studies have shown that chia seeds can help in the management of various chronic diseases such as diabetes, cardiovascular disease, and cancer. The high fiber content in chia seeds helps in regulating blood glucose levels and reduce insulin resistance. The omega-3 fatty acids in chia seeds have anti-inflammatory effects and can lower blood pressure and improve lipid profile, thus reducing the risk of cardiovascular disease. Additionally, chia seeds have been shown to have anticancer properties due to the presence of antioxidants and other bioactive compounds. Chia seeds are also known to aid in weight management by increasing satiety and reducing food intake. They can also improve digestive health by promoting the growth of beneficial gut bacteria. Because of its gelling properties, chia powder can also be used for ice creams, jams, and jellies, which will provide nutrition and nutraceutical benefits.



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**Antimicrobial and antidiabetic Properties of *Melia azedarach*:
A Comprehensive Review**

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Melia azedarach, related to neem, called mahanimbh in Sanskrit, has common names Lilac Tree, Persian Lilac, and White Cedar and is a versatile plant with a wide range of therapeutic properties. In this review, we focus on two of its most important properties, namely its antimicrobial and antidiabetic effects. Neem has been traditionally used for its antimicrobial properties against various microorganisms, including bacteria, fungi, and viruses. The plant contains various bioactive compounds, such as azadirachtin, nimbin, nimbinin, nimbidin, and nimbolide, which have been shown to have potent antimicrobial activity. Additionally, neem has been shown to possess antidiabetic properties by reducing blood glucose levels and improving insulin sensitivity. The underlying mechanisms of these effects involve neem's ability to enhance insulin signaling, increase glucose uptake, and stimulate beta-cell function. This review summarizes the current knowledge on the antimicrobial and antidiabetic properties of neem and discusses their potential use as natural remedies for these conditions



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Bioprospecting of pomegranate rind for nutraceutical principles

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Melia azedarach, related to neem, called mahanimbh in Sanskrit, has common names Lilac Tree, Persian Lilac, and White Cedar and is a versatile plant with a wide range of therapeutic properties. In this review, we focus on two of its most important properties, namely its antimicrobial and antidiabetic effects. Neem has been traditionally used for its antimicrobial properties against various microorganisms, including bacteria, fungi, and viruses. The plant contains various bioactive compounds, such as azadirachtin, nimbin, nimbinin, nimbidin, and nimbolide, which have been shown to have potent antimicrobial activity. Additionally, neem has been shown to possess antidiabetic properties by reducing blood glucose levels and improving insulin sensitivity. The underlying mechanisms of these effects involve neem's ability to enhance insulin signaling, increase glucose uptake, and stimulate beta-cell function. This review summarizes the current knowledge on the antimicrobial and antidiabetic properties of neem and discusses their potential use as natural remedies for these conditions.



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Need for big data analytics for identification of export potential of Indian nutraceutical herbs

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The pomegranate is a fruit that has been traditionally used for its medicinal properties. Its rind, in particular, is a rich source of polyphenols and other bioactive compounds that have been shown to have various health benefits. In this study, we aimed to evaluate the potential of pomegranate rind as a source of nutraceuticals. We conducted bioprospecting of pomegranate rind to identify and isolate bioactive compounds using various extraction techniques. We then characterized the extracted compounds using spectroscopic methods and evaluated their potential as nutraceuticals.

Our results showed that pomegranate rind is a rich source of polyphenols, including ellagic acid, punicalagins, and flavonoids such as quercetin and kaempferol. These compounds exhibited potent antioxidant, anti-inflammatory, and anti-cancer properties. Moreover, they showed potential in the management of various chronic diseases such as diabetes, cardiovascular diseases, and neurodegenerative diseases.

In conclusion, our findings suggest that pomegranate rind is a promising source of nutraceuticals with potent biological activities. Further studies are needed to explore the potential of these compounds in the development of functional foods, dietary supplements, and pharmaceuticals.



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Pepper mint tea - a potent nutraceutical for PCOD management

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Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting reproductive-aged women worldwide. It is characterized by hormonal imbalances, ovarian cysts, insulin resistance, and metabolic abnormalities. The management of PCOS is complex and requires a multidisciplinary approach. In recent years, there has been growing interest in the use of natural products as a complementary therapy for PCOS management. One such product is peppermint tea, which has been traditionally used for its medicinal properties.

Peppermint tea is a popular herbal infusion with a refreshing flavor and aroma. It is derived from the leaves of the peppermint plant (*Mentha piperita*) and is rich in bioactive compounds such as menthol, rosmarinic acid, and flavonoids. In this review, we aim to evaluate the potential of peppermint tea as a nutraceutical for PCOS management.

Our review of the literature suggests that peppermint tea has several potential therapeutic effects in PCOS. It has been shown to improve insulin sensitivity, reduce androgen levels, regulate menstrual cycles, and alleviate symptoms such as hirsutism and acne. Moreover, it has potent antioxidant, anti-inflammatory, and anti-stress properties, which may be beneficial in the management of PCOS-related complications such as cardiovascular diseases and infertility.



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Nutraceutical and millet milk yogurt: A review

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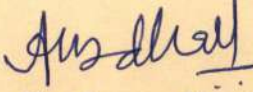
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Nutraceuticals, also known as functional foods, are food products that have potential health benefits beyond basic nutrition. They have gained increasing popularity due to their potential to improve human health and prevent or treat various diseases. Millet, a gluten-free grain, is rich in dietary fiber, minerals, and vitamins. In recent years, millet-based products have gained popularity due to their potential health benefits.

One such product is millet milk yogurt, a dairy-free yogurt made from millet milk. Millet milk is a nutritious and sustainable alternative to dairy milk, as it is rich in protein, minerals, and vitamins. Millet milk yogurt has gained popularity among health-conscious consumers due to its potential health benefits, such as improved gut health and increased immunity.

This review aims to provide an overview of the potential health benefits of nutraceuticals and millet milk yogurt. We discussed the health benefits of millet, the nutritional profile of millet milk, and the potential health benefits of millet milk yogurt. We also review the scientific evidence supporting the health benefits of nutraceuticals, including their role in the prevention and treatment of chronic diseases such as diabetes, obesity, and cardiovascular disease.




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A critical review about nervine nutraceuticals for Parkinson's disease management

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Parkinson's disease (PD) is a progressive neurological disorder that affects millions of people worldwide. The disease is characterized by the loss of dopaminergic neurons in the substantia nigra, leading to motor symptoms such as tremors, rigidity, and bradykinesia. While conventional therapies such as levodopa can help manage these symptoms, they do not slow or stop the progression of the disease. As a result, there has been increasing interest in alternative approaches, such as the use of nervine nutraceuticals, to help manage PD.

Nervine nutraceuticals are plant-based compounds that have been traditionally used to support the nervous system. They have gained increasing attention in recent years due to their potential to improve cognitive function, reduce stress and anxiety, and support overall brain health. Some examples of nervine nutraceuticals include Ginkgo biloba, Bacopa monnieri, and Ashwagandha.

While there is some evidence to suggest that nervine nutraceuticals may have potential benefits for PD management, the scientific evidence is limited and mixed. For example, a few studies have shown that Ginkgo biloba and Bacopa monnieri may improve motor symptoms and cognitive function in PD patients. However, other studies have found no significant effects.

Moreover, there are concerns about the safety and efficacy of nervine nutraceuticals. Many of these compounds have not been extensively studied in humans, and their mechanisms of action are not well understood. Additionally, there is a risk of drug interactions and adverse effects when combining these compounds with conventional PD medications.

While, nervine nutraceuticals may hold promise as a complementary approach for PD management, the scientific evidence is limited and mixed. Further research is needed to fully understand their potential benefits and risks, as well as their mechanisms of action. PD patients should consult with their healthcare provider before using nervine nutraceuticals or any other alternative therapies to manage their symptoms.



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Food for thought: Nutrition and nutraceuticals from traditional foods

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The consumption of traditional foods and nutraceuticals has been associated with numerous health benefits, particularly in the prevention and management of chronic diseases. Traditional diets such as the Mediterranean and Japanese diets, which are rich in fruits, vegetables, whole grains, and lean proteins, have been linked to lower rates of chronic diseases. Bioactive compounds found in traditional foods and nutraceuticals, including polyphenols, carotenoids, and flavonoids, have potent antioxidant and anti-inflammatory properties. For example, curcumin, a polyphenol found in turmeric, and catechins found in green tea, have been shown to have positive effects on cardiovascular health.

Recently, there has been a growing interest in the use of traditional foods and nutraceuticals in functional foods and supplements, which are designed to provide health benefits beyond basic nutrition. Probiotics, for instance, are now widely available in supplements and marketed for their gut health benefits.

Incorporating traditional foods and nutraceuticals into our diets may have a significant impact on our health outcomes, especially in the prevention and management of chronic diseases. As such, research into the bioactive compounds found in these foods and their potential use in functional foods and supplements is of great importance.



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