

# NATIONAL SYMPOSIUM

ON

**Advances in Nutraceuticals and Food Processing**



**NSANFP  
APRIL 8-9, 2016**



**ORGANIZED BY**

School of Sciences & School of Agriculture Science and Research  
Suresh Gyan Vihar University, Jaipur



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**Sunil Sharma**  
**Chairperson**  
Suresh Gyan Vihar University

### ***Message***

**"Let food be the medicine and medicine be the food"**

It gives me immense pleasure that the **National Symposium on “Advances in Nutraceuticals and Food Processing” (NSANFP)** is being organized by School of Sciences & School of Agriculture Science and Research, Suresh Gyan Vihar University, Jaipur on April 8-9, 2016.

Science is always considered a boon because without the auspices of Science, it would have been impossible for us to stay in this world with such great comfort. Science is readily generating new laws and theories, we are in the nascent stage, we have to uncover lot of mysteries of nature. New theories in combination with innovative technologies are finding place in the laboratories every year thus generating new ideas for industrial and economic growth. The industries are eagerly waiting for progress and innovations in the field of science and technology and look towards their R&D wings with great expectations.

Nutraceuticals constitute a novel approach in modern health care and therefore demand for specified health care products such as Dietary supplements including botanicals, nutraceuticals and functional food is increasing at a fast rate. The Symposium aims to provide a scientific platform to all the participants to congregate and interact with subject specialist. I am sure the deliberation of the symposium will be an enlightening and enriching experience for all the participants.

I welcome you all to the National Symposium on **“Advances in Nutraceuticals and Food Processing” (NSANFP)** and extend my best wishes for the grand success of the Symposium.

**Sunil Sharma**



**Dr. Sudhanshu**  
**Chief Mentor**  
Suresh Gyan Vihar University

## ***Message***

I am delighted to learn that National Symposium on “**Advances in Nutraceuticals and Food Processing**” (NSANFP) is being organized by School of Sciences & School of Agriculture Science and Research, Suresh Gyan Vihar University, Jaipur on April 8-9, 2016.

In recent years, a new diet health paradigm is evolving which emphasis more on the positive aspects of diet. The new lifestyle adopted by people today has changed the basic food habits which is the reason of the growth of the Nutraceutical market worldwide. Nutraceuticals, in broad sense are food or part of food playing a significant role in modifying and maintaining normal physiological function that maintains healthy human beings.

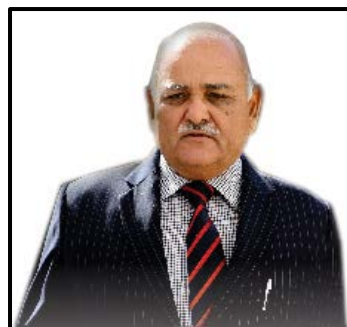
Thus, considering the importance of neutraceutical and functional foods, this National symposium is planned which will provide a platform to food scientist and technologist, biochemist, Biotechnologist, Nutritionist and Industrialist involved in developing neutraceuticals and functional foods to interact and formulate recommendations.

I hope that the deliberations in the symposium will provide an opportunity for transfer of knowledge based on latest research in the relevant field and are considered as an essential part of academic programs of the Universities. I am quite confident that the organizers will be able to hold this symposium to the expectations of the nation's present day requirement.

I wish a grand success to this symposium.

**Dr. Sudhanshu**





**Prof. (Dr.) A. K. Khare**

**President**

Suresh Gyan Vihar University

### ***Message***

It is a matter of great pride that National Symposium on “**Advances in Nutraceuticals and Food Processing**” (NSANFP) is being organized by School of Sciences & School of Agriculture Science and Research, Suresh Gyan Vihar University, Jaipur on April 8-9, 2016.

In recent years, the demand for the use of sustainable and eco-friendly environmental processes is rapidly growing, subjected to economic, public, and legislation pressure. Recent advances in nutrition and food sciences focuses on the latest advancements in the field of nutritional and food sciences. It has major role in improving the quality of life and in the treatment of difficult diseases. I am sure this event will be recognized as the main national event that brings together academia, industry and regulatory institutions to exchange experiences on relevant subjects.

I extend a very warm welcome to all the delegates of the conference. I hope that they wold enjoy their stay in the pink city. I wish the conference a grand success

**Prof. (Dr.) A. K. Khare**



**Prof. (Dr.) Dinesh Goyal**  
Convener



**Prof. (Dr.) S. S. Yadav**  
Convener

### ***Message***

It is our proud privilege to be provided this opportunity to convene this National Symposium on “**Advances in Nutraceuticals and Food Processing**” (NSANFP) is being organized by School of Sciences & School of Agriculture Science and Research, Suresh Gyan Vihar University, Jaipur on April 8-9, 2016.

This national event is another small endeavour in the direction to bring together the experienced intellectual on one hand, and the young inquisitive minds on the other hand, to develop new thoughts, new ideas and new strategies to combat the challenges of changing pattern of world demand for food and health maintains healthy human beings.

We extend a warm welcome to all the participants from across the country to this mega event and hope that two days scientific deliberations of this august congregation will go a long way in shaping the philosophy and action, and make a valuable contribution to the field of Nutraceuticals and Food Processing.

We wish a grand success to this symposium.

**Prof. (Dr.) Dinesh Goyal**  
Principal,  
School of Engineering and Technology

**Prof. (Dr.) S. S. Yadav**  
Principal,  
School of Agriculture Science  
& Research



**Dr. N.D. Jasuja**  
Organizing Secretary



**Dr. Gaurav Sharma**  
Organizing Secretary

### ***Message***

It gives us immense pleasure to welcome you all to the National Symposium on “**Advances in Nutraceuticals and Food Processing**” (NSANFP) is being organized by School of Sciences & School of Agriculture Science and Research, Suresh Gyan Vihar University, Jaipur on April 8-9, 2016.

The main aim of this academic event is to bring together eminent experts, educators, scientists, industrialists, research scholars from India on one single platform for purposeful discussion and reflections on the ways, technologies and policies to be devised/ adopted in order to enhance nutraceuticals food production, health security and livelihood through innovations in this new growing field. We are happy to inform the august gathering that the very announcement of the Symposium evoked an overwhelming response and we are going to receive good number of invited lead speakers, state and national delegates who have kindly consented to participate in the symposium.

We gratefully acknowledge and thank one and all for the success, and all for their tremendous response and enthusiasm. We take this opportunity to extend a warm welcome to all the delegates of the Symposium. We hope that they would enjoy their stay in the pinkcity and we also hope that their brief stay here will prove to be academically stimulating and personally memorable.

We wish the Symposium a grand success.

**Dr. Nakuleshwar Dut Jasuja**  
Associate Professor, School of Sciences

**Dr. Gaurav Sharma**  
Head & Professor, School of Sciences

## **THE EXPRESSION OF DNA REPAIR GENES AND THE MECHANISM OF PRIMING IN GERMINATING SEEDS.**

**Prof. S.N. Sharma**

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Seed longevity is an important trait both ecologically and agronomically. Seeds gradually lose viability even under optimum storage conditions due, in part, to deterioration in genome integrity with time. Seed priming is a commercial technique for improving seed viability and vigour, allowing controlled hydration and induction of pre-germinative metabolism before radical emergence. We studied, the possible role of DNA repair genes in enhancing the physiological quality of seeds in response to seed priming. Expression level of seven genes (GTF II H2, MMZ3/ UEV 1C, RAD3, Rec A-like 1, RAD54, U DNA glycosylase and KU 80) was studied using qRT-PCR (quantitative real time polymerase chain reaction). Not all the genes were expressed at the same time and to the same extent (up- and down-regulation) with respect to the method of priming and seed size. The results indicated the possible role of DNA repair in response to priming resulting in rapid and synchronised germination. Hydro-priming was more effective for improving seed quality.

**Keywords:** Seed, DNA, Repair, PCR, Hydro-priming



## **PLANT NUTRITION ESPECIALLY WITH MICRONUTRIENTS IMPROVES CROP YIELD AND QUALITY**

**Prof. A.K. Gupta and K.C. Gupta**

*Division of Agronomy Rajasthan Agricultural Research Institute Durgapura, Jaipur*

Micronutrients are required in small quantities throughout our life span and their deficiency has for reacting adverse health effects leading to even morbidity and mortality. The source of micronutrients could be inclusion of nutraceuticals or healthy food grown on healthy soil. Zinc, iron, copper, manganese and molybdenum are the micronutrients which are equally essential for plants, animals and human health. Though micronutrients are needed in very small amounts but they are indispensable like any other essential nutrients. We fulfill our micronutrients requirements through usual diet consisting of plant and animal products. The farm animals depend largely for their micronutrients supply on feed from plant origin. There is a high degree of correlation between micronutrient status of soil and that of human beings. Intensive cropping involving HYVs and inadequate mechanism for replenishing micronutrients in soil have led to deficiency of trace elements (micronutrients) in soil. Widespread micronutrient deficiencies in crops, now being recorded all over the country, have resulted in severe losses in yield and nutritional quality. It is estimated that nearly half of the soils on which food crops are grown, are deficient in zinc. Next to zinc, iron (15%), copper (8%) and manganese (6%) deficiencies are also limiting the crop production leading to decline in factor productivity even with balanced NPK fertilization. The crops grown in micronutrient deficient soils contain low levels of micronutrient to meet the demand of animal and human beings and disrupt multiple biological functions. For example, zinc deficiency syndrome is considered next to iron anemia. Zinc concentration in humans depends on their diets. Zinc supplementation decreases the rate of diarrhoea and lower respiratory infection which are the two major causes of child mortality. Thus, correcting micronutrient deficiency in soil through agronomic management will ensure both food and nutritional security.

**Keywords:** Micronutrients, NPK, HYVs

## FOOD PROCESSING IN RELATION TO NUTRACEUTICALS – A PROMISING CONCEPT

**Prof. (Dr.) Pramod Kr. Raghav**

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Nutraceuticals is a broad term that is used to describe any product derived from food sources with extra health benefits in addition to the basic nutritional value found in foods. They are defined differently in different regions of the world for example in Canada the nutraceuticals can be marketed as food or drug, in US there is no boundary it depends on constituents of the nutraceuticals and it can be a drug, food, food ingredient or dietary supplement. Broadly these can be divided in two major categories Dietary Supplements (vitamins, minerals, herbs, amino acids, enzymes etc.,) and Functional Foods (enriched or fortified foods)-an ordinary food that has components or ingredients added to give it a specific medical or physiological benefit, other than a purely nutritional effect is known as the functional food. Here comes the relationship among food processing methods (e.g., drying, heating, freezing, fermentation and simple chemical methods, such as salting and smoking) and functional foods as these methods have their roots in the processing of these foods and are very effective in today's scenario when the demand for processed functional foods is on the peak. Notable developments and improvements made in the newer age from pasteurization, canning/bottling to non-thermal, non-invasive processing techniques such as irradiation, high hydrostatic pressure, high intensity pulsed electric field, oscillating magnetic field, ohmic processing, light pulses and novel chemical and biochemical methods. Further Removal of anti-nutrients to improve nutritional value is being accomplished using targeted process techniques. Anti-nutrients are secondary compounds that prevent their counterparts from being digested. For example, phytic acid in grains has been shown to hinder mineral absorption. Processing to remove the bran of grain remedies this situation. Also recent studies have identified the ability for food processing to enhance nutrient availability. The need for long shelf life, wholesome safe food and the desire to meet consumer demands has motivated the scientific community towards the development of natural compounds for preservation, many of which are also known to provide nutritional benefits. For example anthocyanins are used to provide color as well as for their antioxidant properties. Gums can be used to stabilize/thicken and to boost dietary fiber levels. Hence it is evident that the food processing is playing a vital role in the Nutraceuticals and functional foods a type of nutraceuticals being made with newer and novel food processing techniques are proving boon to the mankind and this is a promising concept indeed.

**Keywords:** Gums, Phytic Acid, Micronutrients, Functional Foods, Dietary Supplements.

## SPICES PROCESSING AND ADULTERATION

**Prof. E. V. Divakara Sastry**

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Spices are an important ingredient of Indian cuisine. India is a major producer, exporter, importer and a consumer too. India is native to several of the spices that are cultivated. It is no hidden secret that most of the spices have medicinal values and are taken in that spirit. Ancient Indian medicine texts like Charak Samhita are replete with references to spices for their medicinal properties. Spices being valuable too, always attract adulteration and greedy traders have been using different and novel means of adulterating the spices for high profit margin or to meet the ever increasing demand for quality spices. Such an attitude by traders often has serious repercussions with health concerns and may prove fatal because of the adulterants used. Adulteration often affects export earnings and market reputation of the country internationally as was witnessed in recent times. Although not all adulteration is intentional and proper cultivation practices often reduces the contaminants and the classified adulterants. Most of the adulteration occurs post-harvest and during processing. It is at this stage several adulterants are mixed reducing the quality and genuineness of the original product. Therefore it is imperative that we understand processing first followed by adulteration, so that both these are understood in terms of spices and their usage.

**Keywords:** Food fortification, micronutrients

## ROLE OF NUTRACEUTICALS IN THE PREVENTION OF CHRONIC DISEASES

**Dr. Ila Joshi**

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Nutraceuticals are considered to be one of the fastest growing areas of interest for human health and disease prevention. The word 'nutraceuticals' refers to food components or active ingredients present in foods, which provide health benefits and are alternative to modern medicine. Nutraceuticals are described as products extracted, purified or produced from a plant, animal or marine source, or produced from dried, powdered, or pressed plant material. These components provide health and medical benefits, including prevention and treatment of the chronic diseases, thereby promoting optimal health, longevity, and quality of life. Life expectancy, across the globe, continues to rise, as does the contribution made by older individuals to the total population. Also, globalization has led to marked changes in the life style and dietary habits; as a result, number of people suffering from chronic non-communicable diseases (NCDs), such as diabetes, atherosclerosis, cardiovascular diseases, cancer, and neurological disorders, is increasing. Regular intake of nutraceuticals may help to delay or prevent the development of chronic progressive disorders. Evidences indicate that the mechanistic actions of natural compounds involve a wide array of biological processes, including activation of antioxidant defenses, which may be a helpful alternative in treatment and prevention of these diseases. Nutraceuticals can provide neuroprotection via a wide range of proposed mechanisms, such as scavenging of free radicals and ROS, chelation of iron, modulation of cell-signaling pathways, and inhibition of inflammation. For diseases expected to increase in number, the people are required to change their lifestyles and include foods rich in nutraceuticals in the diet, which have the ability to counteract this situation.

**Keywords :** Nutraceuticals, Diseases, NCDs.



## **DEVELOPMENT OF FOOD FORTIFICATION PROGRAMS FOR COMBATING MICRONUTRIENT DEFICIENCIES OF PUBLIC HEALTH**

**Dr. Neha Kapoor**

*Department of Chemistry, Hindu College, University of Delhi, New Delhi*

Food in its many manifestations allows us to explore the global control of health and to examine the ways in which food choice is molded by many interests. The global food market is controlled by a small number of companies who operate a system that delivers 'cheap' food to the countries of the developed world. This 'cheap' food comes at a price, which externalizes costs to the nation state in terms of health consequences (diabetes, coronary heart disease and other food-related diseases) Indian diets among people below poverty line are quite monotonous and cereal centric. As a consequence they are deficient in micronutrients especially children of growing age from 1 to 5 years. Their diets are not balanced in terms of daily requirement of many nutrients. This has led to malnutrition among children of this age group as a chronic problem besides various other diseases.

**Keywords:** Food fortification, micronutrients

## MICROALGAE: UNIQUE RESERVOIR OF NUTRACEUTICALS

**Archana Tiwari and Thomas Kiran M.**

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Microalgae are unique photosynthetic organism's possessing plethora of nutraceutical potential. Nutraceuticals are foods having nutritional and pharmaceutical efficacy. Microalgae are great reservoirs of many value added products by virtue of their extraordinary secondary /metabolites. Microalgae have received a lot of attention in the scientific community and biotechnology industry because microalga strains are very good sources of various nutraceuticals, such as omega 3 and omega 6 fatty acids and carotenoids. The use of microalgal biomass is particularly attractive based on the advantages that microalgae are highly productive on arable and nonarable land, thus potentially avoiding competition with food production. Microalgae have unique adaptability to varying environmental conditions by producing secondary metabolites, and they can also be used to purify and take up nutrients from wastewater. Numerous health benefits are associated with algal nutraceuticals like promotion of healthy bones and teeth, weight reduction, cholesterol reduction, disease resistance, improved immune system and brain development, healthier gut and digestive system, blood pressure control and reduction, heart health, antioxidant, antiviral, and anticancer properties. Despite the high amount of protein in microalgae, the dried form has not attracted consumers as a food or food substitute. Some of the major difficulties are the fishy smell and dark green color, which limit their use and their combination with the traditional food. Therefore, the market of microalgae is restricted nowadays to health food products and functional foods. Research is indeed required to overcome these difficulties, like covering its smell or taste by using microencapsulation techniques to combine it with food, but further investigations are required to deploy the benefits of the nutritious protein from microalgae and to overcome these obstacles. Microalgal tiny biofactories will bring about revolutionary changes in the energy, pharmaceutical, cosmetics, and food industries in the coming years throughout the world with more intervention of innovative research.

**Keywords:** Nutraceuticals, Microalgae, pharmaceutical efficacy, omega 6 fatty acids, carotenoids.

## PHYTOCHEMICALS AS NUTRACEUTICALS

**Dr. Bindu Sharma**

*University Maharani College, University of Rajasthan, Jaipur*

Nutraceutical is a hybrid term of nutrition and pharmaceutical i.e. food/part of food with nutritional and therapeutic qualities, therefore are significant in combating life threatening diseases of world like obesity, cardio vascular diseases, cancer, osteoporosis, arthritis, diabetes and cholesterol etc. which basically emerged due to unhealthy life style of today. Nutraceuticals can be broadly categorized as dietary fibers, prebiotics, probiotics, PUFA (poly unsaturated fatty acids) and phytoconstituents or herbal products. Phytochemicals of nutraceutical importance are bioactive constituents that promote health and are considered as a link between food and pharmaceuticals. Plants are known to contain innumerable biologically active metabolites which are responsible for their therapeutic potential. Among the natural compounds, secondary metabolites are of prime interest, considered as active biological principles of medicinal plants and are real healers in the process of medication. In contrast to primary metabolites (carbohydrates, proteins, amino acids and chlorophyll), which are essential and universally present in all plants, secondary metabolites (alkaloids, terpenoids, phenolics, flavonoids, steroids etc.) are non-essential and vary in their distribution from plant to plant. Dietary intake of secondary metabolites/ phytochemicals may promote health benefits, protecting against chronic degenerative disorders, such as cancer, cardiovascular and neurodegenerative diseases. Majority of foods, such as whole grains, beans, fruits, vegetables, spices and herbs contain phytonutrients/ phytochemicals which either alone and/or in combination, have tremendous therapeutic potential in curing various ailments. Polyphenols, isoflavones, anthocyanidins, phytoestrogens, terpenoids, carotenoids, phytosterols and glucosinolates are a few examples of significant dietary components of plant origin that are enhancing food value by incorporating various therapeutic efficacies. Plants are untapped reservoir of such compounds, therefore research should be geared towards this direction and novel nutraceuticals of plant origin should be considered as a vital aspect of dietary disease preventive food component.

**Keywords:** Polyphenols

## AMELIORATING EFFECT OF GA3 AND SILICON NANO-PARTICLES (AEROSIL) ON STEVIA REBAUDIANA BERT

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<sup>1</sup>*Plant Biotechnology Laboratory, Department of Botany, Dayalbagh Educational University, Agra 282 005, India*

<sup>2</sup>*Department of Zoology, University Of Rajasthan*

Stevia (*Stevia rebaudiana* Bertoni) (Family- Asteraceae), locally known as Madhupatra, is known as sweet herb. It is a perennial plant. The leaves are mild green and intensely sweet. Stevioside and Rebaudioside are the sweetening compounds in the leaves. These compounds might be more than 200 times sweeter than sugar. Currently consumers have more inclination towards products that are claimed to be 'All Natural' and 'Low CHO'. Stevia is versatile herb with incredible sweetness that can be safely used in herbal medicines; tonics for diabetic patients and also in the daily usage products like biscuits, jams, chocolates, ice-creams, baked foods, soft drinks, soda, candies and also common beverages like dip tea, coffee and herbal tea that are used for diabetic patients and also for health conscious consumers. Keeping this in mind, it was decided to conduct a pot experiment to study the effect of foliar application of GA3 + silicon nano-particles (Aerosil) alone or in combination on growth characteristics, physiological attributes and biochemical parameters of sweet plant (*Stevia rebaudiana*) under the agro-climatic conditions of Aligarh, Uttar Pradesh. The optimum concentration of GA3 and nano-particles treatments (50 to 200 ppm), by virtue of their growth stimulating role might be considered helpful in promoting photosynthesis, uptake of mineral nutrients, and biosynthesis of chlorophyll and carotenoids, etc. Hence, higher values (compared to the water-spray control) of CA activity (13.05%), chlorophyll content (58.12%), carotenoid content (11.11%) and leaf-N (10.37%), -P (5.40%) and -K (1.70%) contents were observed. The improvement in these parameters was, in turn, manifested in the enhancement of plant shoot (32.60%) and root length (23.44%) as well as plant fresh (76.60%) and dry weight (72.02%). The enhancement in values for most of the parameters studied due to application of the foliar spray of GA3 + silicon nano-particles (Aerosil) might be considered a valuable observation. This improvement in the performance may be attributed to the effect of GA3 + Nano-300 (Aerosil), followed by that of GA3 + Nano-200(Aerosil).



## FORMULATION AND NUTRITIONAL ESTIMATION OF WHEAT PULSE BASED BLENDED FLOURS AND DEVELOPMENT OF RECIPES

**Swati Vyas and Divya Dwivedi**

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In developing countries like India malnutrition continues to be major public health problem. Diets in developing countries generally lack macro as well as micro nutrients particularly energy and proteins so strategies are needed to emphasize an increase in total food intake and improve its quality. Hence present study was designed to formulate Wheat Pulse Based Blended Flours. Wheat-Moong Blend (WMU) and Wheat- Moth Blend (WMO) were developed by roasting technique. Nutritional and anti-nutritional estimations were done and the results highlighted that the moisture content of WMU and WMO was 3% and 6.16, ash and protein content was more in WMU 3.3g and 14.23g respectively. Fat was estimated to be 4.46 g in WMU and 4.61g in WMO, crude fiber was estimated to be 5.48g in WMU and 4.50g in WMO. The anti-nutrients composition of WMU and WMO was oxalic acid: 9.2 mg and 7.3 mg, phytic acid being 75 mg in WMU and 85.2 mg in WMO blend. Six basic recipes of *Halwa*, *Cheela*, *Appa*, *Muffins*, *Atta-ladoo* and *Handwa* were developed by using both the Flours which were further compared with the control recipes (original and standardized recipes). Results reported that *Halwa*, *Cheela*, *Atta-Ladoo* and *Muffins* prepared from WMU blend were found to be more acceptable, where as *Handwa* and *Appa* prepared from WMO blend were more acceptable. Such kind of blended flours ensures better nutritive value and better acceptability, protein quality is also enhanced, and net availability of nutrient is also improved because of roasting. This can be promising strategy for combating malnutrition.

**Key words:** Malnutrition, roasting, sensory evaluation, acceptability trial

## IMPORTANCE OF NUTRITION AND NUTRACEUTICAL IN HUMAN HEALTH

**Pratibha Jain**

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Nutrition plays a great role in our daily life because life styles of human beings have changed drastically due to industrial age, increasing work living speed, longer work schedules and various psychological pressures, which have led to an increase of Diabetes, Obesity various cancer and vascular diseases. A particular level of any particular nutrition such as protein, Fats, Vitamins, and Carbohydrates etc. is necessary for our physical and mental growth. The term “Nutraceutical” combines two words – Nutrient (a nourishing food component) and Pharmaceutical (a medical drug). Nutraceuticals term is used to describe with extra health benefits in addition to the basic nutritional value found in foods. The food products used as nutraceuticals can be categorized as Dietary fiber, prebiotics, Probiotics, Polyunsaturated fatty acids, antioxidants and other different types of herbal foods. These nutraceuticals help in combating some of the major health problems of the century such as obesity, cardiovascular disease, Osteoporosis, Arthritis, Diabetes, cholesterol etc.

**Keywords:** Dietary Fiber, Probiotics, Preboitics, Osteoporosis.

## RECENT ADVANCES OF NANOTECHNOLOGY IN FOOD PACKAGING

**Mohammad Irfan Ali, Gaurav Sharma, NakuleshwarDut Jasuja,  
and Abhishek Raj Agrawal**

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Today, nanotech food packaging is a major focus in the food industry. Nanotechnology can be used in plastic food packaging to make it stronger, lighter or perform better. Packaging that incorporates nanomaterial can be made to be “smart,” which means it can respond to environmental conditions or alert a consumer about contaminations or repair itself or the presence of pathogens. Antimicrobials such as nanoparticles of silver or titanium dioxide can be used in packaging to prevent spoilage of foods. Another addition is the introduction of nanoparticles of clay into packaging to block oxygen, carbon dioxide and moisture from reaching the food, and also aids in preventing spoilage. Nanotechnology can modify permeability of packaging material, increasing barrier properties, improving mechanical and heat-resistance, developing active antimicrobial surfaces, and creates nano-biodegradable packaging materials. It has been also used in innovative development of biosensors for detection of pathogens and chemical contaminants.

**Keywords:** Food packaging, Packaging materials Food industry, Food technology.

## PROBIOTICS: HUMAN HEALTH

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Probiotics are live bacteria and yeasts that are good for your health, especially your digestive system. Probiotics are often called "good" or "helpful" bacteria because they help keep your gut healthy. Probiotics are naturally found in your body. Doctors often suggest them to help with digestive problems. When you lose "good" bacteria in your body (like after you take antibiotics, for example), probiotics can help replace them. They can help balance your "good" and "bad" bacteria to keep your body working like it should. Many types of bacteria are classified as probiotics such as ***Lactobacillus*** (This may be the most common probiotic. It's the one you'll find in yogurt and other fermented foods). ***Bifidobacterium*** you can also find it in some dairy products. Advantages of probiotics are that they treat are Irritable bowel syndrome, inflammatory bowel disease (IBD), Infectious diarrhea (caused by viruses, bacteria, or parasites), and Antibiotic-related diarrhea. They have helped with Skin conditions, like eczema, Urinary and vaginal health, Preventing allergies and colds, Oral health. The consumption of a cocktail containing genetically modified strains of probiotic bacteria, increased the death rate of patients with acute pancreatitis. ***Lactobacillus septicaemia*** which is a potentially fatal disease caused by the consumption of probiotics by people with lowered immune systems. Some examples are Yogurt, Kefir, Sauerkraut, Dark chocolate, Microalgae, Miso soup, Pickles, Kimchi, Tempeh, Kombucha tea.

**Key words:** Yogurt, Lactobacillus, Bifidobacterium.



## INHIBITORY STUDIES OF SOME SELECTED PLANT PRODUCTS AS METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA)

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Methicillin resistant *Staphylococcus aureus* (MRSA) has been emerging as an important pathogen worldwide causing both, hospital acquired and community acquired infections. Methicillin resistance (mediated by pbp2a protein encoded by mec a gene) is a serious issue limiting treatment options and necessitating the search of newer safe and effective alternative treatment regimens. This study evaluates the potential of the plant derived products including conjugated linoleic(18:2) acid, thymoquinone, nigellone (dithymoquinone), melanthin, nigilline, damascenine, and tannins and its derivatives as effective antibacterial agents by means of invitro and insilico based studies. Microscopic examination revealed that the bacterial isolates were *Staphylococci* as the colonies were in clusters and Gram +ve, as they absorbed crystal violet. On MSA medium, fermentation of Mannitol resulted in the formation of yellow hollow around their growth. Colour of the colony was golden yellow. The isolates were catalase +ve, Coagulase +ve, DNase +ve and hemolysis on Blood Agar plates was of beta type. On the basis of above characteristics all the bacterial isolates were identified belonging to genus *Staphylococcus* and species *aureus* and Methicillin Resistant *Staphylococcus aureus* (MRSA). This MRSA selected for the present study was inhibited by the isolated plant products. The strain was resistant to Penicillin, Cefoxitin and Oxacillin. It was sensitive to Vancomycin, Linezolid and Teicoplanin.

**Key words:** *Staphylococcus aureus*, Methicillin resistance, Inhibitory Studies.

## STRUCTURAL ANALYSIS OF DUFFY ANTIGEN RECEPTORS FOR CHEMOKINE

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Duffy antigen chemokine receptor is also known as Fy glycoprotein. It also known as CD234 (cluster Differentiation 234). The duffy antigen is located on the surface of red blood cells. The protein encoded by this gene is a glycosylated membrane protein and non-specific receptor for several chemokines. The protein is also receptor for human malaria parasite like Plasmodium Vivax and Plasmodium Knowalsi. Available structure of DARC in PDB (Protein Data Bank) 4NUV- <http://www.rcsb.org/pdb/explore/explore.do?structureId=4NUVDARC> has a high content of  $\alpha$ -helical secondary structure - typical of chemokine receptors. The DARC N Terminal forms an amphipathic helix upon DBP-R II and give attachment with DARC. 4NUV has four chain A,B,C AND D. Chain A and B duffy receptor are found on plasmodium vivax while chain C and D are duffy antigen found on erythrocytes membrane and also responsible for legend plasmodium vivax in to erythrocytes. The Duffy antigen on erythrocytes acts as receptor for invasion by the human malaria parasites Plasmodium vivax and Plasmodium knowalsi. This was first shown in 1980. This antigen may also play a role in erythrocyte invasion in the rodent malarial parasite Plasmodium yoelli. The protein Fy6 is required for *P. vivax* invasion.

**Key words:** Antigen Receptors, *Plasmodium knowalsi*, *Plasmodium yoelli*

## HYPOGLYCAEMIC AND ANTI-DIABETIC ACTIVITY OF LEAF EXTRACTS *MANGIFERA INDICA* IN ALLOXAN-INDUCED DIABETIC ALBINO RAT (*RATTUS NORVEGICUS*)

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*Diabetes mellitus* is a chronicle disorder characterized by altered cellular metabolism. So many traditional herbs are being used by diabetic patients to control this disease. The objective of the study is to investigate the alcoholic extracts of *mangifera indica* for hypoglycemic effects in diabetic rats after alloxan injection in rats. *Diabetes* was induced in rat by alloxan monohydrate at dose of 150 mg/kg body weight injected intraperitoneal. Also alloxanized induced rats were administered with 200 and 400 mg/kg body weight orally daily of extract for a period of 28 days. At the end of the administration period, the rats were anaesthetized and dissect for the collection of blood and kidney tissues. In diabetic group, the urea, uric acid, albumin, creatinine protein level as well as serum glucose levels were significantly increased ( $p < 0.001$ ) in comparison with the control groups. Diabetic group treated by extract at the dose of 200 and 400mg / kg body weight orally significantly ( $p < 0.001$ ) reduced and normalized these biochemical parameters compared with alloxan induced diabetic group. Histopathological study also did show adverse alternation in the morphological architecture of the kidney tissue. The results suggested that ethanolic extract of *Mangifera indica* leaves possesses protective effect against alloxan induced diabetic rats.

**Keywords:** Alloxan KFT, kidney tissue, *Mangifera indica*

## UTILIZATION OF *SPIRULINA* Spp. AS A PROMINENT SOURCE OF FOOD

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*Spirulina* is a microalgae which has the potential to be a novel sources of food as well as animal feed. The organism is a Cyanobacteria, which represents a large group within the prokaryotic kingdom. They are oxygenic photosynthetic organisms that are known for a long time. They are an important source of protein, fatty acids as well as other metabolites that have proven to have antimicrobial and antioxidant activities. *Spirulina* has been described by the World Health Organization (WHO) as one of the greatest super foods on earth serving as an example of the potential of microalgae. This review provides insights on the uses of *Spirulina* as potential food source (providing proteins, vitamins, minerals and PUFA); antioxidants and natural colorant that may be used to produce attractive, high nutritive and healthy foods. Even when used in small amounts in nutrition of different animals, *Spirulina* have been credited with improving the immune system, increasing of weight, the number of eggs, reproductive performance, or reducing cholesterol levels, indicating the possibility of new farming methods in order to improve the quality of meat and eggs.

**Keywords:** *Spirulina*, antioxidants, single cell protein, natural colorant, PUFA, Cyanobacteria

## **ANTIDIABETIC, ANTI-HYPERLIPIDEMIC EFFECT OF *AEGLE MARMALOSE* IN ALLOXAN INDUCED TYPE -1 DIABETIC RAT (*RATTUS NORVEGICUS*)**

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Diabetes mellitus is one of the common metabolic disorders and 2.8% of the population suffers from this disease throughout the world and it may cross 5.4% by the year 2025. Plants have been utilised as a natural source of medicinal compounds since thousands of years. Human is using numerous plants and plant derived products to cures and relief from various physical and mental illness. *Aegle marmalose* is widely used traditional system of medicine to treat diabetes in India. The aim of the study was to examine the antidiabetic, anti-hyperlipidemic Effect of herbal formulation. In the preset study diabetes was induced in albino rat models by using alloxan monohydrate. Alloxan monohydrate significantly increase the serum glucose levels as well as LDL, VLDL, TC and lipid peroxidation levels. While HDL Level decreases in alloxan induced diabetic rat. *Aegle marmalose* (200 mg/ kg b.w) and 400mg/kg b.w.) leaf extract treated for 28 days in alloxanized diabetic rat. Ethanolic leaf extract was significantly decreased the serum glucose levels as well as lipid profile and lipid peroxidation levels. The results showed that it has significant anti-hyperglycaemic effect in experimental model of diabetes mellitus.

**Keywords:** *Aegle marmalose* Alloxan, *Rattus norvegicus*, hyperglycaemia, hyperlipidaemia.

## **5,5'-TETRAHYDRO-1H,3H-FURO[3,4-C]FURAN-1,4-DIYLBIS(2-CHLORO-1,3-BENZODIOXOLE, SESAMINE DERIVATIVE, NEUTRITIVE IN LOWERING HYPERGLYCEMIA**

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Recently, studies have reported that sesame oil lowered blood pressure and improved antioxidant status in hypertensive and diabetic-hypertensive patients. This study was to evaluate the effectiveness of synthetic sesamine derivative (3-o-methyl-d-glucose) in normal and alloxan induced rats. The study included 30 Wistar strain albino rats and randomly divided into 5 equal groups, normal rats (Only fed with normal rat feed), alloxan monohydrate 150mg/kg BW rats, sesamin derivative 10mg/kg BW, alloxan monohydrate 150mg/kg BW rats+ sesamin derivative 10mg/kg BW, Alloxan monohydrate, reference control i.e., Standard drug Glibenclamide 10 mg/kg BW was administered for 28 days for various biochemical analysis. The induction of diabetes has caused significant initial increase in the fasting blood glucose levels of all the groups. The diabetic control group shows significant increase throughout the study period when compared with the normal control group ( $p < 0.001$ ). However, the extract treated groups and the standard treated group shows significant decrease in the fasting blood glucose levels when compared with diabetic control ( $p < 0.001$ ) which was determined on the 7th and 14th day of experiment. SGOT, SGPT and ALP, show significantly lower levels of SGOT, SGPT and ALP in comparison to the diabetic control group ( $p < 0.001$ ). Fat accumulation in liver and inflammation were reduced with sesamine derivative. Sesamine derivative can provide a safe and effective option that may be useful in clinical practice to lower hyperglycemia.

## SOY FOODS: A PROTECTIVE MEASURE OR A CAUSE OF GROWTH OF BREAST CANCER

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Breast cancer is the most common invasive cancer in females worldwide. It accounts for 16% of all female cancers and 22.9% of invasive cancers in women, 18.2% of all cancer deaths worldwide, including both males and females, are from breast cancer. Cancer and cancer treatments may affect appetite, taste, smell, and the ability to eat enough food or absorb the nutrients from food which leads to malnutrition. Eating too little protein and calories is a very common problem for cancer patients. Having enough protein and calories is important for healing, fighting infection, and having enough energy. Nutrition is an important part of cancer treatment. The National Cancer Institute estimates that at least 35% of all cancers have a nutritional connection. Foods rich in botanical factors or phytonutrients include berries, dark green leafy vegetables, citrus fruits, legumes (beans of all sorts including soy) and whole grains. Dietary fiber is the indigestible part of foods of plant origin. This is best accomplished by eating fiber rich foods at each meal such as whole grain cereals, breads, pastas, beans, leafy vegetables, fruits, nuts and seeds. Soy protein contains several active phytonutrients that may protect against hormone sensitive cancers partly by blocking receptors with plant estrogens called genistein and daidzein and partly by the action of the Bowman Birk inhibitor or other protease inhibitors naturally present in the beans. Lecithin is also an important component of soy foods. In contrast Soy foods have a lot of isoflavones, which are weak estrogen-like compounds, estrogen can promote the development, growth, and spread of breast cancers, so eating a lot of soy foods or soy isoflavones might worsen the prognosis of women diagnosed with breast cancer. In conclusion early-stage breast cancer persons do not recommended soy in large amounts. The patient who had breast cancer can eat soy in a moderate amount (up to 3 servings per day) which is considered safe and acceptable.

**Keywords:** Soy, Nutrition, Cancer, Isoflavones, Estrogen

## AMELIORATING EFFECT OF ANTIOXIDANTS AGAINST *MYCOBACTERIUM TUBERCULOSIS*

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Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. It is the major cause of deaths in the world. The rate of mortality is high if it is conjugated with HIV. The multiple drug resistant strains make it difficult to diagnose and treat the disease. It can be easily spread around the world so there is a need to evolve new diagnostic and treatment methods that are rapid, cost effective and easy to use. Antioxidants are among the most popular health-protecting products that anti-oxidants are good for human health. Antioxidants like N-acetyl cysteine have shown to inhibit growth of tuberculosis bacteria inside tubercular abscess. Other antioxidants like manganese (II) mesotetrakis-(N-methylpyridinium-2-yl) porphyrin also show these kinds of observations. The free radicals activity increases and total antioxidant status (enzymatic and non-enzymatic) becomes low in all TB cases, irrespective of treatment status, indicating that there is an oxidative stress. Oxidative stress results into defective T cell mediated immunity which may accelerate tuberculosis infection. Therefore, antioxidant supplementation in tuberculosis patients along with recommended chemotherapy may help to combat the oxidative stress mediated defective cell mediated immunity. Nutritional supplementation may represent a novel approach for fast recovery. Hence, the therapeutic benefit of exogenously administered antioxidants like vitamin C, tocopherols etc. need to be assessed under carefully controlled clinical setup.

**Keywords:** Antioxidants, *Mycobacterium tuberculosis*, oxidative stress.



## OMEGA 3 FATTY ACID EPA AND DHA: HEALTH BENEFITS

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Omega-3 (n-3) fatty acid have been linked to health ageing throughout life. Our bodies do not efficiently produce some omega-3 fatty acid but must get them from food. Omega-3 fatty acids are obtained from sources: fish, fish oil product (animal source), microalgae and nut, seeds(plant source). The best food source of both DHA and EPA is cold water fish, yogurt, eggs omega-3 pet soft gel product. Specific content of EPA and DHA are Efalex® capsules, Efalex® liquidEfalex® chewies. Omega-3 EPA/DHP are important for proper brain and eye development in infant, help lower blood pressure help. Maintain health triglyceride level, protect against stroke. EPA and DHA may affect many of cardiovascular function including, weight management.

**Keywords:** EPA, DHA, Fish oil, Cardiovascular, maintain health.

## EPIDEMIOLOGY OF ENTEROCOCCAL INFECTION AND THEIR ANTIBIOTIC SUSCEPTIBILITY

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Enterococci are Gram positive bacteria, which mainly form gastrointestinal flora. Enterococcus has consistently ranked among the most frequent pathogen causing significant hospital-acquired infections. They were classified as group D streptococci. Clinically the most important species associated with human infections are *E. faecalis* and *E. faecium*. Enterococcus develops acquired resistance to several classes of antibiotics either by mutation or by transfer of plasmids and transposons. The acquisition of high-level aminoglycoside resistance and vancomycin resistance limits the therapeutic options available for clinicians. The present study was undertaken to determine the antimicrobial susceptibility pattern of the *Enterococcus spp.* with special reference to high level aminoglycoside resistance (HLAR). The present study was done at tertiary care health centre in south east Rajasthan. A total of 100 isolates taken from both OPD and IPD patients for period of one year, are included in the study. A total 100 isolates of Enterococcus from various clinical samples were taken for the current study. In the current study seven species were identified which are *E. faecalis*, *E. faecium*, *E. raffinosus*, *E. durans*, *E. mundtii*, *E. gallinarum*, and *E. solitarus*. Among all the species *E. faecalis* (57) was the predominant isolate in all the samples, followed by *E. faecium* (33), *E. raffinosus* (4), *E. durans* and *E. mundtii* (2 each), *E. gallinarum*, and *E. solitarus* (1 each). Enterococcal infections are difficult to treat as this bacterium has intrinsic resistance to various antibiotics and also can acquire resistance against other antibiotics available for treatment. In the case of complicated Enterococcus infection combination of cephalosporin and aminoglycoside are usually used, but in high level aminoglycoside resistance (HLAR) even this combination is unable to inhibit the organism. So it is important to test Enterococci for HLAR. The present study concluded that there is an emergence of HLAR in our set up and as these isolates have very limited treatment options, so the use of higher antibiotics and combination therapy must be started only on the grounds of sensitivity pattern.

**Key words:** Enterococcus, HLAR (High level aminoglycoside resistance), Drug resistance, Hospital acquired infection

## GENETIC ALTERATIONS, A BIOLOGICAL TOOL FOR IMPROVING EFFICACY OF CONVENTIONAL FOOD SUPPLEMENTS

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The last decade has truly been the decade of biotechnology. Biotechnological revolution is one of the most important scientific revolution ever happened. In this review we are discussing the important techniques that are used to improve our standard of food habits. As we know 842 million people around the globe are undernourished. And not even this 2 billion people suffers from malnutrition. “Hidden hunger” is one of the very dangerous problems of our society that can only be eradicated through scientific and genetic alterations in staples. Mostly the problems lies in the before poverty level (BPL) society of citizens, these people are not able to afford good nutritious food hence faces a lot of problems in biological development. Biotechnology and genetic engineering offers a deal to eradicate the hidden hunger through various techniques including: Biofortification through selective breeding (conventional technique) and gene altering methods. So far crops such as: rice, maize, and wheat have been fortified. Biofortification through genetic engineering not only allows us to help improve the quality of food production but also can be proved helpful in many more ways. The crops can also be designed to contain bioactive compounds (particularly helpful in curing chronic diseases, such as cancer and heart diseases) crops that are biofortified in this way are known as “designer crops”. After all the efforts done by scientists and investors on creating nutritionally enhanced crops through biotechnology there still lays some issues and controversies over these genetically modified (G.M) crops. It all circles around biosafety or the vulnerability of farmers and corporate monopolies.

**Keywords:** Undernourished, Malnutrition, Genetic engineering, Biofortification, selective breeding, designer crops

## PLANTS, A CONVENTIONAL FOOD SUPPLEMENT AND, THEIR PROSPECTIVE USE AS BIOFUEL IN INDIA- A REVIEW

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India being a developing country has not yet been able to achieve a complete control over its pollution problems. So as to compensate our increasing need of fossil fuels we need an alternative fuel. Science is now a day's accomplishing new platforms to make our lifestyle more convenient hence newer technologies are very much required to be brought by all means to our lives. As we all know plants serve us many purposes including being a great source of food but here we are discussing its special features that can be used to create an alternative fuel. "Biofuels" are literally the solution to many of our environment related problems. Also new ideas of extracting biofuels from non-edible sources instead of maize (being a great source of food hence needs to be concerned before used as a biofuel producer). In our review we have decided to look over the two plant varieties being: soapnut (*Sapindus mukorossi*) and jatropha (*Jatropha Curcas*, L.) as being non-edible species these two are no longer concern with the fulfillment of food stock hence can prove to be a better biofuel. Experimental studies have shown that both these oils have great potential to be used for biodiesel production. Fatty acid methyl ester (FAME) from cold pressed soapnut seed oil was envisaged as biodiesel source for the first time. Soapnut oil was found to have average of 9.1% free FA, which is definitely beneficial. Jatropha oil contains approximately 14% free fatty acid (FA), approximately 5% higher than soapnut oil. Soapnut oil biodiesel contains approximately 85% unsaturated fatty acid (FA) while jatropha oil biodiesel was found to have approximately 80% unsaturated fatty acid (FA). Over 97% conversion to FAME was achieved for both soapnut and jatropha oil. These are the merits which lead us to study the non-edible sources over edible ones; this truly can help us conquer our needs for biofuel production. Other than this some scientists are now working on plant genetic alterations for easier ways to get affordable cellulosic ethanol.

**Keywords:** Biofuels, Non-edible sources, maize, Soapnut, Jatropha, Fatty acid methyl ester, Biodiesel, Fatty acid, Cellulosic ethanol.

## ROLE OF OMEGA- 3 FATTY ACIDS IN METABOLIC SYNDROME

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The Metabolic Syndrome is recognized as one of the leading worldwide health problems. It is defined as a constellation of any 3 of the following 5 disorders- overweight/ obesity, hypertension, elevated serum triglycerides, a low concentration of HDL cholesterol and high fasting plasma glucose. Metabolic syndrome is a growing epidemic throughout the world. Approximately 1 adult in every 4 or 5 has metabolic syndrome. The incidence increases with age in both males and females (10% in individuals aged 20–29, 20% in individuals aged 40–49, and 45% in individuals aged 60–69). Insulin resistance, visceral adiposity, atherogenic dyslipidemia, endothelial dysfunction, genetic susceptibility, elevated blood pressure, hypercoagulable state, and chronic stress are the several factors which constitute the syndrome. Omega-3 (n-3) fatty acids, which have positive effects on health, are the precursors of eicosanoids. Studies show that n-3 fatty acids, especially  $\alpha$ -linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), are beneficial in a variety of disease conditions such as atherosclerosis, obesity and obesity induced insulin resistance in liver. The n-3 fatty acids decrease blood plasma concentration of free fatty acids and hence increase insulin sensitivity, lower blood plasma glucose concentration its sequela- oxidative stress, endothelial damage and atherosclerosis. They also lower blood pressure and depression and have a positive effect on gradual memory loss linked to aging. The n-3 poly unsaturated fatty acids (PUFA) improve cardiovascular health mainly by reducing plasma triglyceride (TG) levels, resolving the symptoms of arrhythmia and inflammation. The n-3 PUFA cardio-protective effect depends mainly on its dosage. The American Heart Association (AHA) has recommended 1,000 mg/d for treatment of existing cardiovascular diseases. Studies have also shown that n-3 PUFA stimulate muscle glycogen synthesis and modulate antioxidant enzyme activity. The AHA Dietary Guidelines to include at least two servings of fish per week. Recently, flaxseed has been identified as a significant alternative source of n-3 fatty acids. Flax seeds contain high levels of dietary fiber as well as lignans, an abundance of micronutrients and n-3 fatty acids and may be beneficial in improving the lipid profile of people with metabolic syndrome.

## FORMULATION AND EVALUATION OF ANTICANCER HERBAL TABLETS:A CRITICAL REVIEW

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Cancer, also called malignancy, is an abnormal growth of cells, one of the most dreaded complex diseases involving numerous temporal changes in cell physiology, which ultimately lead to malignant tumors, Neoplasia. More than 100 types of cancers have been reported, symptoms vary depending on the type and treatment may include chemotherapy, radiation, and/or surgery. Herbal remedies are assumed to be safe, cause less complications and are less likely to cause dependency. It is well known and reported that the anticancer activity of medicinal plants is due to antioxidant compositions. Thus, the various standardized combinations and preparation of dose and dosage regimen of the active components assessed for their synergistic effects, which could play a critical role in cancer treatment. Some of the medicinal plants like *Cinnamomum tamala*, *Madhuca longifolia*, *Adina cordifolia*, *Sida*, *Veronicaefolia*, *Terminalia arjuna*, *Catharanthus roseus*, *Zingiber Officinalis*, *Alumcepa*, *Aloe barbadensis*, *Citrus medica*, *Nicotiana tabacum*, *Allium sativum*, *Emblica officinalis*, *Glucyrrhiza glabra*, *Ocimum sanctum*, *Curcuma longa* etc., evaluated and showed prominent anticancer activity. Evaluation parameters to assess the *in vitro* anticancer activity includes Caspase-3, Caspase-9, Chromosomal Aberration Assay, Alamar Blue Resazurin Reduction assay, LAD assay, XTT assay, Sulforhodamine-B assay, MTT assay, DNA Fragmentation assay, ELISA assay, Neutral Red Uptake Cytotoxic assay, SRB assay, Trypan Blue assay. Evaluation of dried extract or granules includes Bulk density, Tapped density, Carr's index, Hausner's ratio, Angle of repose while the tablets evaluated by Drug-Excipient Compatibility Study by FT-IR, Stability studies, Hardness, Thickness, Weight Variation, Friability, Disintegration Time, *In vitro* Dissolution test.

**Keywords:** Cancer, Medicinal Plants, Antioxidants, *In vitro*.

## GANODERMA LUCIDUM: A POTENT NUTRACEUTICAL

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Mushrooms were considered as a special delicacy by early civilizations and valued as a credible source of nutrients including considerable amounts of dietary fibre, minerals, and vitamins. Besides dietary benefits, mushrooms also possess nutraceutical properties. In this paper, the nutraceutical properties of Ganoderma lucidum (Lingzhi) have been mentioned. Lingzhi has been widely used in China for medicinal purposes since before the Common Era. Lingzhi is a woody mushroom of basidiomycetes group and is widely consumed in the belief that it promotes health and longevity, lowers the risk of cancer and heart disease and boosts the immune system. Ganoderma lucidum contains high concentration of polysaccharides and triterpenes. These active components are proven to strengthen our immune system. Polysaccharides are the complex carbohydrates that enhance immunity and protect us from fatal diseases like cancer. One of those potent bioactives is  $\beta$ -glucan, comprising a backbone of glucose residues linked by  $\beta$ -(1 $\rightarrow$ 3)-glycosidic bonds with attached  $\beta$ -(1 $\rightarrow$ 6) branch points, which exhibits antitumor and immunostimulating properties. The immunomodulating action of mushroom polysaccharides is to stimulate natural killer cells, T-cells, B-cells, neutrophils, and macrophage dependent immune system responses. Basically, their antitumor abilities are influenced by the molecular mass, branching configuration, conformation, and chemical modification of the polysaccharides. Many products of this mushroom are available in the market in the form of capsule, aqueous solution, powder and tablets. These are used as dietary supplements. Nutraceuticals are a growing health care industry at global level as awareness about the disease preventive measures is increasing. Therefore, Lingzhi has attained good status in its usage to promote health.

**Keywords:**  $\beta$ -Glucans, anticancer properties, polysaccharides

## PROBIOTICS AS NUTRACEUTICAL

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Nutraceuticals are more correctly defined as parts of a food or a whole food that have a medical or health benefit, including the prevention and treatment of disease. Nutraceuticals are active component of the food that provides extra health benefits in addition to basic nutritional value. In this paper, importance of probiotics as nutraceutical is mentioned. Probiotics are also considered as nutraceuticals because it provides health benefits apart from the traditional nutrition value. The aim has been made to fulfill the condition for a cultured milk product to be called as a probiotics food. Possibility of probiotics for their use as functional foods has also been described. Probiotics confer protection against pathogens owing to their capacity to compete with pathogens or their displacement by adhering to intestinal epithelial cells. There are several benefits of consuming probiotics such as normalization of the intestinal microflora like on consuming antibiotics there is significant decrease in the level of microflora and these probiotics help to increase microflora in our intestine up to a good level. Probiotics have the ability to block the seizure of potential pathogens in the gut. It also helps in the therapeutic treatment for different types of diarrhea; also provide relief in irritation and inflammation, prevention of colon cancer, reduction of blood cholesterol levels. Therefore, probiotics can be consumed as nutraceutical.

**Keywords:** Nutraceuticals, Antioxidants, Probiotics, Milk, Health benefits



## VALUE ADDITION OF *PHYLLANTHUS EMBLICA* L. FRUITS BY EXTRACTING NOVEL ANTIMICROBIAL AGENT AGAINST MULTIPLE DRUG RESISTANT UROPATHOGENS

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The emergence of resistance against routine antimicrobial agents has been a serious concern to the society. The discovery of novel antimicrobial agents has lately become a necessity. The present study was conducted to evaluate the potential of *Phyllanthusemblica* L. fruits in treating multiple drug resistant human pathogens causing urinary tract infections (UTI). Phytochemical analysis of the dried fruit showed the presence of saponins, polyphenols, tannins, triterpenes, cardiac glycosides and alkaloids. The dried fruit of *Phyllanthusemblica* was powdered and soxhlet extracted with 95% methanol. The crude extract was concentrated in vacuum and its antimicrobial activity was tested against clinical isolates of multiple drug resistant uropathogens; E.coli, Staphylococcus aureus and Pseudomonas aeruginosa. The extract showed promising antimicrobial activity against all the pathogens tested. GC-MS analysis of the methanolic extract revealed the presence of one major compound 3-oxa-bicyclo[3.2.0]hept-6-ene 2,4-dione. Extraction of novel antimicrobial agent from *Phyllanthusemblica* fruits for treating multiple drug resistant pathogenic infections can lead to the value addition of this tropical medicinal plant fruit which is an important component of the Ayurvedic medicine Triphala.

**Keywords:** *Phyllanthusemblica*, antimicrobial, multiple drug resistance, UTI

## FOOD PROCESSING BY HIGH PRESSURE PROCESSING

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High Pressure Processing (HPP) is one of oldest food processing technique also known as pascalization. High Pressure Processing is promising “non-thermal” technology that has been with the aim of obtaining microbiologically safe food products. It avoids undesirable changes in nutritional properties and physicochemical. Thus become one of the innovative food processing technologies accepted by the consumers. Providing high pressure kill microorganism by interrupting their cellular function without the use of heat that can damage the taste, texture along with nutritional value of the food product. Food Safety & Inspectional Service recognizes high pressure processing as an acceptable food safety intervention for eliminating *Listeria monocytogenes* in processed products also effective in inactivating micro-organisms such as *E.coli*, *Salmonella* & *Vibrio*, as well as many yeasts, molds and bacteria responsible for food spoilage. For food processing, 200-800 MPa pressure is required. Usually, 600 MPa is the optimum pressure for processing commercial food products. In addition to lengthening the shelf-life of food products, high pressure processing (HPP) can modify functional properties of components such as proteins, which in turn can lead to development of new products.

## FOOD PROCESSING, TECHNOLOGY AND EDIBLE VACCINES

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Food processing is the conversion of raw ingredients, by physical or chemical means into edible food. Food processing combines raw food ingredients to produce marketable food products that can be easily prepared and served by the consumer. Food processing typically involves activities such as mincing and macerating, liquefaction, emulsification, and cooking (such as broiling, frying, or grilling); picking, pasteurization, and many other kinds of preservation; and canning or other packaging. Food technology is a branch of food science that deals with the production processes that make foods. The process wasn't called canning had a major impact on food preservation techniques. Edible vaccines hold great promise as a cost-effective, easy-to-administer, easy-to-store, fail-safe and socio culturally readily acceptable vaccine delivery system, especially for the poor developing countries. It involves introduction of selected desired genes into plants and then inducing these altered plants to manufacture the encoded proteins.

**Keywords:** Edible food, Food processing, Edible vaccines

## POTENTIAL ROLE OF NUTRACEUTICALS IN HUMAN HEALTH

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Nutraceuticals are the fusion of ‘nutrition’ and ‘pharmaceutical’. Nutraceuticals are modified food or part of food which plays a significant role in modifying and maintaining normal physiological function that maintains healthy human beings. Food and drugs from nature place a quite significant role in public healthcare system throughout the world. Nutraceuticals have evolved from the recognition of the link between food and health. Nutraceuticals contain health-promoting ingredients or natural components that have a potential health benefit for the body. The food products used as nutraceuticals can be categorized as dietary fibre, prebiotics, probiotics, polyunsaturated fatty acids, antioxidants and other different types of herbal/ natural foods. Rapid advances in science and technology, increasing health care costs, an aging population and rising interest in attaining wellness through diet are among the factors fuelling interest in nutraceuticals. These nutraceuticals help in combating some of the major health problems of the century such as obesity, cardiovascular diseases, cancer, osteoporosis, arthritis, diabetes, cholesterol etc. Nutraceuticals currently on the market represent a small fraction of the possible products. The principal reasons for the growth of the nutraceutical market worldwide are the current population and the health trends. The vast potential for functional foods will not be achieved without extensive scientific research to ensure the safety and efficacy of these products. In whole, ‘nutraceutical’ has leads to the new era of medicine and health, in which the food industry has become a research oriented sector.

**Keywords:** Nutraceuticals, Nutrition, Dietary fiber, Probiotics, Human diet

## BENEFITS OF FUNGAL ENZYMES ON HUMAN LIFE

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Digestive and Systemic are the two applications in the dietary supplement field of enzymes produced by fungus. Fungal enzymes are used in the process of breakdown of proteins, fats, carbohydrates like the other enzymes which are needed for digestion in our body. Various digestive problems can be treated with the help of the enzymes such as gas, bloating, heartburn, lactose intolerance, malabsorption, steatorrhea, pancreatic insufficiency, etc. In systemic applications fungal proteases are used that are being involved in the controlling of inflammatory conditions. Scientific research has found that the roots of these applications are presently in ethnic and cultural traditions. For the efficacy of fungal enzymes, many clinical trials have been given and in vitro studies have proved the safety. The enzymes which have to survive through the acidity of the stomach to be viable therapeutically. Animal derived enzymes (e.g. Pancreatin) are therefore coated enterically to protect them from the acidity of the stomach. Enteric coating provides some protection from the acid but various times the tablet gets break in the stomach or does not completely get dissolved in the small intestine. Due to this the performance of the enzyme preparation gets severely affected. Fungal proteases on the other hand are remarkably acid stable and can easily tolerate acid and do not require enteric coating. Fungal (plant) sources not only include protease, amylase and lipase activities but also a variety of other enzymes such as lactase and cellulase etc. are offered. Overall, fungal enzymes have proven themselves to be superior to pancreatin with respect to pH range, acid stability, activity, variety and safety. In addition to the above benefits, these enzymes are animal friendly and suitable for a vegetarian diet.

**Key words:** Protease, Amylase, lipase, lactase, Cellulose, Pancreatin

## ADVANCEMENT OF NUTRACEUTICALS IN CANCER PREVENTION

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Cancer is a chronic and life threatening disease and one of the leading causes of death worldwide. Multiple factors are involved in the pathogenesis and progression of cancer which include nutrients, DNA, cell signalling, and hormones. Recent researches have shown that there are various nutrients which can alter the cell signalling process and indirectly act on the cancerous cell by cutting off the essential elements needed for the multiplication. There are also nutrients which can induce apoptosis (cell death) and trigger the immune response against cancer which make the cancer treatment more reasonable. These days' numbers of anti-cancer and pro-immune nutraceuticals for instance Vitamin D3, selenium, green tea extract, AHCC and Nano Vitamin C are offered in market and many more are still under development. For the future development further clinical trials will be required which will help in expound the role of nutraceuticals in the treatment and prevention of cancer and also explain the role of complementary and alternative medicine (CAM) therapies in cancer management.

## BIOLOGICAL SYNTHESIS AND CHARACTERIZATION OF SELENIUM NANOPARTICLES

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The biological synthesis of metal nanoparticles is of current interest due to their ecofriendly and inexpensive method. Selenium is non metallic element present in water and food used as antioxidant. Due to overexposure it can be considered as an environmental toxicant. In our study we are using convenient method to mitigate the toxicity of selenium at higher level. The use of biogenic selenium nanoparticles for various purposes is going to be an issue of considerable importance; thus, appropriate simple methods should be developed and tested for the synthesis and measurement of toxicity profile of synthesized selenium nanoparticles. In this study, a fungus was isolated from a soil sample, identified as *Aspergillus flavus* and sodium selenite used for synthesis of selenium nanoparticles (SeNPs). UV–Vis spectroscopy studies were carried out to confirm SeNPs formation within a day. SEM and TEM were also used to characterize both size and shapes of the SeNPs. The toxicity profiles of SeNPs were measured on rice plant at 160 µg/ml concentration. The results show that spherical particles with average size of 50-80 nm were formed by adding a culture supernatant of *A. flavus* to selenium ions solution and interestingly noticed that SeNPs treated plant had better root system than either the non treated or sodium selenite treated plants. This approach appears to be an easy and ecofriendly method for synthesis of small SeNPs. The toxicity of sodium selenite when present in plant at higher amount has not been reported yet.

**Key Words:** Selenium Nanoparticles, *Aspergillus flavus*, SEM, TEM, Biological Synthesis

## ORGANOLEPTIC CHARACTERISTICS OF VALUE ADDED PRODUCTS USING FLAXSEEDS

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**Flax** (also known as **common flax** or **linseed**) (binomial name: *Linum usitatissimum*) is a member of the genus *Linum* in the family *Linaceae*. Flax is a blue flowering crop. The seeds of the flax are tiny, smooth, flat and pointed at one end. Flaxseeds contain Lignans, fiber, and omega-3 fatty acids. Flaxseed oil is rich in alpha-linolenic acid that is both an essential fatty acid and omega-3 fatty acid. Because of its link to good health flaxseed is rapidly becoming a new food in many diets. Its growing popularity is due to health imparting benefits in reducing cardiovascular diseases, decreased risk of cancer, particularly of the mammary and prostate gland, anti-inflammatory activity, laxative effect, and alleviation of menopausal symptoms and osteoporosis. As flax seeds possess nutraceutical property, so, an attempt was made to develop value added products by using flaxseeds. In the present study, flax seeds were procured from the local market and were roasted and then ground to powder and this powder was incorporated in different proportions (10%, 20%, 30%, 40%). Products developed were *thepla*, muffins, *khakhra* and *mathri*. *Thepla* was prepared using fenugreek (15%) and coriander (5%) leaves which are also good sources of micronutrients. The products were evaluated for organoleptic qualities – colour, appearance, taste, after taste and over all acceptability by a panel of 10 members using 5 point rating scale. The nutritional composition of flax seeds was also analysed using standard methods. The overall acceptability of *mathri* containing 10% flaxseeds was highly acceptable (4.4) leaving behind the standard *mathri*, followed by *mathri* containing 20%, 30% and 40% flax seeds respectively. Overall acceptability of standard *thepla* and *thepla* containing 10% flax seeds was same ie 4.4 and the overall acceptability of *thepla* containing 20% and 30% flax seeds was same ie 4. The mean scores of muffins with codes - MU1, MU2, MU3, MU4, MU5 were 4.8, 4.6, 4.4, 3.4, and 3 respectively. Muffin were more spongy after adding flaxseed due to it's raising quality. The mean score of *khakra* samples with codes- K1,K2,K3and K4 were 4.8 ,4.4,3.8,and 3.4 respectively. *Khakra*'s were crispier after the addition of 10gm of flaxseed. If more than 20gm of flaxseed was added to make *khakra* it will be difficult to prepare and unacceptable in colour.



## NEUTRACEUTICAL USE OF HEALTH

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The aim of this current review article was to examine the impact of Nutraceuticals as an alternative treatment for different types of disease. The term "nutraceutical" was coined in 1989 from "nutrition" and "pharmaceutical" by Stephen DeFelice. Majority of the cardiovascular disease (CVD) are preventable and controllable. It was reported that low intake of fruits and vegetables is associated with a high mortality in cardiovascular disease. Nutraceuticals help to maintain heart health. Examples of nutraceuticals that can have positive effects on cardiovascular well-being include: Omega 3, 6 and 9 fatty acids, CoQ10 (ubiquinone), Vitamin E (tocopherol), Vitamin B3 (Niacin), garlic, flavonoids. They reduce cholesterol levels, antioxidants, protect against cancer. Protect eyes against age related muscular degenerations. Fight against cancer breast cancer, colon cancer, strongly anti-inflammatory. The mechanisms by which they exert these effects are as varied as the nutraceuticals themselves but some of the most common include reductions in: blood pressure, circulating lipids, platelet aggregation, and plaques formation.

**Keywords:** Nutraceuticals, Cardiovascular diseases, cancer.

## NUTRITIONAL VALUE AND HEALTH BENEFITS OF FLAX SEED - A REVIEW

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The Latin name of flaxseed (*Linum usitatissimum*) means “very useful” is a blue flowering crop that produces small, flat seeds ranging in color from golden yellow to reddish brown, which is an annual herb. The seeds are commonly consumed in one of three ways: whole seed, ground seed (powder or meal), or flaxseed oil. The ancient Egyptians used flaxseed as both food and medicine. The health benefits of flaxmeal are due to its alpha-linolenic acid (ALA), fibre and lignan content. The high omega-3 and protein content make flaxseed meal unique and superior to other fibre supplements and food ingredients. Scientific evidences support consumption of flaxseed for the high content in omega-3, omega-6 rich oil,  $\alpha$ -linolenic acid, lignans, high quality proteins and fibers, compounds which are biologically active in the prevention of some chronic diseases such as many types of cancer, diabetes, cardiovascular diseases and cerebrovascular stroke. Flaxseed had been studied in humans, including constipation/laxative, attention-deficit hyperactivity disorder, hyperlipidemia, atherosclerosis/coronary artery disease, breast cancer, cyclic mastalgia (breast pain), menopausal symptoms, hyperglycemia/diabetes, hypertension, lupus nephritis, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), and prostate cancer. Most of the available evidence investigates the efficacy of alpha-linoleic acid found in flaxseed compared with fish oil, and almost all of the available studies are poor quality. Although flaxseed and flaxseed oil have several promising future uses, the available literature does not support recommendation for any condition at this time. So, This review highlights the potential of ‘flax seed’ as a ‘neutraceutical’ and its role as a protective and therapeutic medicinal food.

**Keywords:** Flax seed, Neutraceutical, Health benefits, food, Medicine.

## NEW DEVELOPMENT AND TRENDS IN FOOD PROCESSING

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Preservation is the most important process related to all the food products. Preservation of food products can be achieved by various ways like addition of salt, sugars, preservatives, antioxidants, naturally occurring antimicrobial substances and also by the processes like drying, freezing, refrigerated storage and Hurdle Technology. Novel technologies like microwave heating, Pulsed Electric Field (PEF) Technology, High Pressure Processing (HPP), Pulsed Light Technology, Ohmic Heating, Ultrasonics, Pulsed X-Rays are also applied for the preservation of food products. The main problem with the thermal processing method is loss of colour, flavor, vitamins and other nutrients in food products. A detailed review is made for different non thermal processing methods and its merits and demerits are analyzed and illustrated for applications in various industries. This paper investigates different non thermal processing methods and its suitability to different food processing industries which deals with different foods like meat, milk, fish, egg and ready-to-eat foods.

**Keywords:** Non thermal, Preservation, HPP, PEF, SCF.

## ETHNOBOTANICAL STUDIES ON MEDICINAL PLANT *TINOSPORA CORDIFOLIA*

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*Tinospora Cordifolia* is a climbing shrub belonging to the family Menispermaceae. This plant is indigenous to Indian subcontinent. Commonly known as Giloy and Guduchi; Guduchi is distributed all over the tropical Indian subcontinent and China, climbing to an elevation of 300 m. Aqueous extract of the shrub contains alkaloids, steroids, glycosides, Polysaccharides etc. which make its enormous use in medicinal industry. Indian system of medicines prescribed decoction of stem part of the shrub. *T. cordifolia* is broadly using in ayurvedic system of medicine/veterinary folk medicine for its anti-spasmodic, general tonic, anti-inflammatory, anti-allergic, anti-arthritis and anti-diabetic properties. Alcoholic extract of the stem shows activity against *Escherichia coli*. The decoction of the leaves is used for treatment of gout. Its fruit is used in the treatment of jaundice and rheumatism. Methanol extract of leaves is rich in flavonoids, alkaloids and glycosides. The plant strengthens the kidneys of the renal failure patients. Decoction of the plant is orally used as a diuretic. Another important medicinal use enlightened is treatment of splenomegaly (Immunological abnormalities in splenomegaly is because of increase count of IgM and size of spleen). Immunomodulatory effect of the drug is useful in hyper reactive malarious splenomegaly (HMS). *Tinospora Cordifolia* has been proved as immune promotor. *T. cordifolia* root is use for its anti-leprotic, anti-stress and anti-malarial activities. The stem parts is bitter and cure stomachic, stimulates bile secretion, diuretic, causes constipation, enriches the blood and treatment of jaundice. The stem and root of *T. cordifolia* are used as an antidote to snake bite and scorpion recommend in combination with other drugs. Dried barks of *T. cordifolia* have anti-spasmodic, anti-pyretic, anti-inflammatory, anti-allergic and anti-leprotic properties. *T. cordifolia* contain strong antioxidant compounds and therefore the plants contain active compounds which still need to be explored. Now a day the aqueous extract was used as antiviral (swine flu) drug in herbal preparation.

**Keywords:** *Tinospora Cordifolia*, IgM, Methanol and Ethnobotanical studies

## ANTIOXIDANT ACTIVITY OF SOME ARID ZONE MEDICINAL PLANTS

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To counteract the destructive effect of activated oxygen species, cells display an array of enzymatic and non-enzymatic antioxidant defense. This defense system consists of low molecular weight antioxidants such as ascorbate, glutathione, proline, flavonoids and phenols. Arid zone of Rajasthan has its own importance and specific characteristic with respect to endemic and a large number of plants of economic importance and medicinal uses. Methanolic and Dichloromethane extracts of six arid zone plants (*Argemonemexicana.*, *Asparagus racemosus.*, *Cyperusrotundus.*, *Tageteserecta.*, *Tinosoracordifolia.*, *Melia azedarac*) used in Indian phytotherapy for the treatment of inflammation, fever, muscle relaxation, jaundice, urinary disorders and other kidney problems were screened *in vitro* for antioxidant activity by DPPH assay. All the methanolic extracts of the selected plant species exhibited appreciable activity as compared to the dichloromethane extracts, among these *A.mexicana*, *A.racemosus*, *C. rotundus*, *T. erecta* and *M. azedarach*. Exhibited higher antioxidant activity with 29.6 µg/ml IC<sub>50</sub> value.

**Keywords:** Medicinal Plants, Phytochemical screening and Antioxidant

## MULTIDRUG RESISTANCE: FROM MAN TO MICROORGANISM

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Multidrug resistance (MDR) is defined as resistance of any living organism against a wide spectrum of drugs that neither share a common structure or a common target. Multidrug resistance is a problem that has spread throughout the evolutionary scale. Human are posted with double edged threat with multi resistance: first, in human their malignant cells acquire resistance to drugs in due course of time and as a result it chemotherapy failed in cancer. Second, they are continuously attacked by harmful pathogens which provide them resistance to common drugs. It has been observed that the overproduction of specific efflux pump proteins belonging to ATP binding cassette or major facilitator super family of protein in eukaryotes and prokaryotes, is linked to multidrug resistance phenomena. Fungal pathogens of human acquire resistance to antifungal components: is relatively a novel phenomenon, But the increasing threats by fungal infections, in immunocompromised patients and due to the non availability of effective treatments, antifungal resistance has become a serious concern among clinicians, A host of responsible genes involved in have been also identified in various pathogenic fungi including in common human pathogenic yeast *Candida albicans*. Research so far concluded that while antifungal resistance is the culmination of multiple factors, there could still be a unifying mechanism of drug resistance in these pathogens.

**Keywords:** Multidrug Resistance; Malignant cells, Pathogens

## ROLE OF NUTRACEUTICALS AND FOOD SUPPLEMENTS IN HUMAN HEALTH

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Nowadays changing habits of production and consumption of food products have adverse impact on social life and environment too. In the modern age modern diseases i.e. obesity, osteoporosis, cancer, diabetes, allergies and dental problems are very common. Both developed and developing countries are facing problems relating to high energy foods and unbalanced diets. In recent year to overcome these health problems a new diet paradigm is evolving, which places more emphasis on the positive aspects of diet “Nutraceutical”. Nutraceutical is the hybrid of ‘nutrition’ and ‘pharmaceutical’. In broad these are food or part of food having properties to provide disease prevention & protection. The nutraceuticals can be categorized on the basis of food product used as dietary fibre, prebiotics, probiotics, polyunsaturated fatty acids, antioxidants and other different types of herbal/ natural foods. These nutraceuticals help in combating some of the major modern age health problems discussed above. In whole, ‘nutraceutical’ has leads to the new era of medicine and health, in which the food industry has become a research oriented sector. The aim of this review is to focus on the general concepts and the health-promoting effects of several potential nutraceuticals that can be incorporated into foods.

**Keywords:** Nutraceuticals, Health, Human health, Food.

## A THERMOPHILIC ESTERASE ENZYME FROM *RHODOCOCCUS* SP: PARTIAL PURIFICATION AND CHARACTERIZATION

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Soil bacterial pure cultures were isolated from the surroundings of *Gangotri* region of *Uttarakhand Himalaya*. Those isolates showed potential for esterolytic activity and amongst them 2 bacterial isolates were selected. The morphological and physiological characteristics of the isolate Enzyme was observed as Gram positive, rod, catalase positive, indole test negative, positive to fermentation test for glucose and xylose, which can grow in the Nutrient Broth medium (OD at 600 = 0.679 [1:20 dilution], after 22 h). Esterase Enzyme production was optimized with nutrient broth (composition in g/L; beef extract 3.0; peptone 5.0; NaCl 5.0; glucose 10.0; SDW, pH 7.2-7.4). 100 ml broth was inoculated with Enzyme sample and incubated in 60°C at 120 rpm. Samples were collected from 0 h to 60 h after every 2 h and all the parameters like growth profile, enzyme production, total protein, carbon utilization, total biomass production were estimated in order to optimize standard enzyme production condition and time in shake flask. The bacterium was at early log phase and total biomass was almost stable. More than 80% sugar has been utilized by that time. So Sample was incubated in modified nutrient broth for 48 hour after inoculation at 37°C in incubator shaker at 120 r.p.m. for further laboratory scale purification. The stain was show the activity on higher temperature 70°C that indicate the isolated enzyme is highly thermostable. The optimum pH activity of the isolated enzyme is 11.0 and is active over a broad range of pH 5.0-11.0.



## A ESTERASE ENZYME FROM THERMOPHILIC *RHODOCOCCUS* Spp. PARTIAL PURIFICATION AND CHARACTERIZATION

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Soil bacterial pure cultures were isolated from the surroundings of *Gangotri* region of *Uttarakhand Himalaya*. Those isolates showed potential for esterolytic activity and amongst them 2 bacterial isolates were selected. The morphological and physiological characteristics of the isolate was observed as Gram positive, rod, catalase positive, indole test negative, positive to fermentation test for glucose and xylose, which can grow in the Nutrient Broth medium (OD at 600 = 0.679 [1:20 dilution], after 22 h). Esterase enzyme production was optimized with nutrient broth (composition in g/L; beef extract 3.0; peptone 5.0; NaCl 5.0; glucose 10.0; SDW, pH 7.2-7.4). 100 ml broth was inoculated with enzyme sample and incubated in 60°C at 120 rpm. Samples were collected from 0 h to 60 h after every 2 h and all the parameters like growth profile, enzyme production, total protein, carbon utilization, total biomass production were estimated in order to optimize standard enzyme production condition and time in shake flask. The bacterium was at early log phase and total biomass was almost stable. More than 80% sugar has been utilized by that time. So Sample was incubated in modified nutrient broth for 48 hour after inoculation at 37°C in incubator shaker at 120 r.p.m. for further laboratory scale purification. The stain was show the activity on higher temperature 70°C that indicates the isolated enzyme is highly thermostable. The optimum pH activity of the isolated enzyme is 11.0 and is active over a broad range of pH 5.0-11.0. Higher thermostability and active over a broad range of pH would make this enzyme more attractive for industrial fermentation.

## ACTINOBACTERIA- AN ALLURING SOURCE OF ENZYMES IN FOOD INDUSTRY

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Actinomycetes are prokaryotic, filamentous, rod shaped, gram positive and slow growing bacteria. They are the bacteria that resemble to fungi in their morphology and colony characteristics. The actinomycetes are renowned in the microbial studies owing to their capability to produce biologically active molecules. They are being extensively investigated for their ability to produce the primary and secondary metabolites which are of commercial use in the therapeutic and agriculture industry. Actinobacteria have been traced in various habitats like terrestrial, aquatic and plants too. Actinomycetes are the producers of numerous enzymes like amylase, cellulases, gelatinase, lectinases, protease, ureases and xylanases that are lucrative and of great biotechnological importance. Amylase is one of the frequently used enzymes in starch industries. Cellulase enzymes are involved in enzymatic hydrolysis of cellulose and so of great use in the food industry. Proteases have extensive applications in a range of industrial products and processes including detergents, pharmaceuticals, leather, baking, food, and animal feed industries. They are also potent in producing diverse amino acids that are of great significance. This review presents a detailed account of the various enzymes and amino acids produced by various actinobacteria and their biotechnological and commercial importance.

**Keywords:** Actinomycetes, enzymes, amino acids, food, bakery, Brewery.

## **EFFECT OF BLANCHING MICRONUTRIENT CONTENT OF PAPAYA AND SENSORY EVALUATION OF VALUE ADDED PRODUCTS**

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Fruits provide necessary nutrition supplements to our body, improve the body condition and provide perfect supplements for hormonal imbalance. 'Papaya' being a yellow-orange coloured fruit, has high amount of carotenoids and is considered to be a rich source of antioxidants. For increasing the availability of the fruits throughout the year, various processing techniques are being used over the past many years. Processing inactivates the enzymes, modifies the texture and preserves the colour, flavour and nutritional value of the fruit. Blanching is one of the processing techniques generally used prior to freezing, canning or drying. The present study was an attempt to process papaya cultivar-Sinta using blanching and microwave drying techniques and then estimate nutritional composition. Developed value added products (basenladoo and biscuits) by adding papaya in dry powder form in different proportion ranging from 10 to 30g. The findings of micronutrient,  $\beta$ -carotene, calcium and magnesium were significantly higher in blanched papaya in comparison to unblanched papaya. But potassium content was found to be significantly less in blanched sample. Furthermore, after blanching process micronutrients retained. Whereas, the sensory evaluation of papaya basenladoo done by 15 semi trained panel members using 5 point rating scale, 10g proportion of papaya powder in the products were most accepted in comparison to other samples with different proportion.

## IMPORTANCE OF NUTRITION AND NUTRACEUTICAL IN HUMAN HEALTH

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Nutrition plays a great role in our daily life because life styles of human beings have changed drastically due to industrial age, increasing work living speed, longer work schedules and various psychological pressures, which have led to an increased of Diabetes, Obesity various cancer and vascular diseases. A particular level of any particular nutrition such as protein, Fats , Vitamins , Carbohydrates etc. is necessary for our physical and mental growth. The term “Nutraceutical ” combines two words – Nutrient (a nourishing food component) and Pharmaceutical (a medical drug). Nutraceuticals term is used to describe with extra health benefits in addition to the basic nutritional value found in foods. The food products used as nutraceuticals can be categorized as Dietary fiber, prebiotics, Probiotics, Polyunsaturated fatty acids, antioxidants and other different types of herbal foods. These nutraceuticals help in combating some of the major health problems of the century such as obesity, cardiovascular disease, Osteoporosis, Arthritis, Diabetes, cholesterol etc.

**Keywords:** Dietary Fiber, Probiotics, Preboitics, Osteoporosis.

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## PROCESSING & VALUE ADDITION OF MEDICINAL PLANTS

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Medicinal plants being rich source in secondary metabolites are proved to be the potential source of natural products – drugs. India is blessed with rich tradition of plant based healthcare systems contained in its classical text like charaksamhita and sushrutasamhita. Knowledge of wild plants was important to the development of more than half of the prescribed drugs in India. Deforestation and development (urbanization) has dangerously threatened many medicinal and aromatic species in both developing and industrialized countries. Nature in laboratory can be proved to be a boon to rural healthcare system around the globe for an affordable healthcare. These natural resources can surely replace the high price of drugs. Also, the globe demand of medicinal plants & its products are increasing. The economic value of Indian medicinal plant is recognized by the world & this industry of medicinal plants has reached approx 15,000 crores in 2015. Biomass from wild & cultivated sources is the basic raw material of medicinal and aromatic plants (MAPs) subjected to processing for value addition. Value addition can be done at all levels (low, medium and high) through simple or highly complicated processing technologies in India & several other countries. Small entrepreneurs and farmers can employ simple value addition technologies using locally available instruments for affordable investment in peeling and drying, cutting MAPs into pieces of convenient size and grading, powdering, preparation of concentrates or healthcare drinks etc. High level value addition requires sophisticated technologies, technical personnel, costly equipment, electrical supply, government approvals, quality testing, accreditation etc. Herbal extracts, pure chemicals, aroma chemicals & a range of consumer products are the end products of these processing.

## NUTRAGENOMICS: ADVANCES IN FOOD SCIENCE

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The nutritional health and well-being of humans are entirely dependent on plant foods either directly or indirectly when plants are consumed by animals. Plant foods provide almost all essential vitamins and minerals and a number of other health-promoting phytochemicals. As micronutrient concentrations are often low in staple crops, research is under way to understand and manipulate synthesis of micronutrients in order to improve crop nutritional quality. Nutrigenomics is the application of high-throughput genomics tools in nutrition research. Applied wisely, it will promote an increased understanding of how nutrition influences metabolic pathways and homeostatic control, how this regulation is disturbed in the early phase of a diet-related disease and to what extent individual sensitizing genotypes contribute to such diseases. Ultimately, nutrigenomics will allow effective dietary-intervention strategies to recover normal homeostasis and to prevent diet-related diseases. Genome sequencing projects are providing novel approaches for identifying plant biosynthetic genes of nutritional importance. Understanding the role of diet in human evolution is fundamental for the development of evidence-based, genome-informed nutritional practices in the era of personal genomics.

**Key words:** Nutrigenomics, dietary-intervention strategies, homeostasis, micronutrients

## PHYTOCHEMICAL SCREENING OF ANTIOXIDANT RICH FOOD BASED MIX AND DEVELOPMENT OF RECIPE

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Diet and nutrition plays an important role in the promotion and maintenance of good health, various plant based material have been used for years in life to treat diseases all over the world. The Phyto chemical components of foods are known to possess antioxidant, antifungal, anti-bacterial and anti-inflammatory properties. Due to these medicinal properties phytochemical screening is necessary. Thus the present study was designed to check the presence of certain phytochemicals. The antioxidant rich food based mix: cereal pulse based mix was developed using commercially released varieties of-wheat-Raj 1432, Bengal gram-RSG 973, soybean-Pratap soya, Amla-banarasi and Curry leaves. Composition of Mixes: Control Mix (75:15:10) ; Mix A (70:15:10:5), Mix B (70:15:10:2.5:2.5) The results of the phytochemical screening revealed the presence of medicinally active components such as alkaloids, saponins, tannins and flavanoids. Mix C contains flavanoids and both Mix A and B contains flavanoids, saponins and alkaloids. Khakhara prepared by all the mixes were evaluated for organoleptic characters like appearance, colour, texture, after taste and overall acceptability by using five point hedonic rating scale. The results of the sensory evaluation revealed that mean overall acceptability of the khakhara prepared with the mix C scored ( $4.4 \pm 0.89$ ) which was highest when compared with mix A ( $4 \pm 0.0$ ) and mix B ( $3.6 \pm 0.54$ ). Therefore utilization of prepared mixes help in the overall well-being of the society.

## HUMAN HEALTH BENEFITS AND THE NUTRITIONAL VALUE OF ORGANIC FOODS- A REVIEW

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The human body needs nutritious food to stay healthy. Food is the body's main source of energy. The essential nutrients come from plants – fruit, vegetables, grains, legumes, nuts, seeds and animals – dairy food, eggs and meat. Without adequate nutrition from food, we become susceptible to disease. Simply stated -a lack of nutrients leads to malnutrition-malnutrition leads to disease. Organic food is derived from crops or animals produced in a farming system that avoids the use of man-made fertilizers, pesticides, growth regulators and livestock feed additives (Institute of Food Science and Technology, 1999). Organic farming systems rely on crop rotation, animal and plant manures, some hand weeding and biological pest control and Organic methods in farming are considered as environment friendly. Demand for organically produced food has grown rapidly, with 'It's better for you' a key motivation for purchase. To assess the accuracy of this statement, attention must be focused on those aspects of food quality that directly affect health – biological value and nutritional quality. The biological value of food identifies how food influences human and animal health. Nutritional quality is the capacity of a food to support health, growth and reproduction.

**Keywords:** Food, organic food, crop, biological value, nutritional value, health



## PHYTOESTROGENS- STEPPING TOWARDS NATURE

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Phytoestrogens are naturally occurring, non steroidal compounds found in plants that are able to exert estrogenic effects. They are members of the phytochemical family and occur in a number of legumes, beans, fruits, vegetables, nuts and seeds. Phytoestrogen containing foods as well as food supplements are now gaining popularity and are increasingly being prescribed to patients in the gynaecology and menopause clinics. Food or food supplements containing phytoestrogens are often advocated as an alternative to HRT in women with contraindications to conventional estrogen replacement or in women simply wanting more 'natural' alternatives. As they are the naturally occurring forms of estrogen, they are better accepted by many women for alleviating their menopausal complaints and associated problems. From a nutritional perspective, phytochemicals are not traditional nutrients because they are not essential in the diet and their absence does not cause a specific deficiency disease. Yet research suggests that diets rich in phytochemicals are associated with more subtle health benefits and reduced risks of several chronic diseases.



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