Department of Food Technology

HEALTHY FOODS

Society of Food Technocrats

2020

Bhai Gurdas Institute of Engineering and Technology, Sangrur-148001

Message

Dr. Guninderjit Singh Jawandha
Chairman
Bhai Gurdas Group Of Institutions

I am delighted to have the opportunity to release "Society of Food Technocrats", the annual college magazine. In this era of cut throat competition, apart study. One needs to have the holistic development of personality & this is our prerogative to chisel your thinking & persona here. The magazine will act as a platform for your creativity & writing aptitude & I intently believe that you would have an all-round development of your personality during your sojourn in this temple of learning. I congratulate the Director, staff & students for publishing "Society of Food Technocrats". I hope this issue would be meaningful, enjoyable & memorable in achieving its objectives.

Message

Prof. (Dr.) Tanuja Srivastava
Director
Bhai Gurdas Institute of Engineering and Technology

It is a matter of great pleasure for me to learn that Editorial Board is bringing out an issue of the College magazine 'Society of Food Technocrats'. I would like to appreciate those who have contributed articles for the college magazine as this shows the hard work, and the hidden potential of the students. I hereby congratulate those who contributed for the college magazine and welcome those who want to avail the opportunity next time.

Prof. (Dr.) Tanuja Srivastava
Director

Message

Dr. Syed Insha Rafiq
Head of Department
Food Technology

I am happy that department of Food technology is publishing yet another issue of "Society of Food Technocrats 2020" This magazine is by the student & for the Students. It aims at providing a platform to the students to explore their latent Capabilities & talent, to express their creativity and to develop their technical skills as you scan through the pages of the magazine, it will enlighten you with the important milestone the department has achieved this year. Beside, our budding talent have expressed their thoughts, ideas, hopes, feelings, aspirations & Convictions in a creative way.

I congratulate the editorial board for unleashing the hidden potential of the students & appreciate them for their effort in bringing out their issue.

Wishing the magazine a lasting success.

Dr. Syed Insha Rafiq
Head of Department
Food Technology

Message

Er. Swati Priyadarshi
Assistant Professor
Food Technology

It gives us great pleasure to bring you another issue of "Society of Food Technocrats", the college magazine of Bhai Gurdas Institute of Engineering & Technology. The name and fame of an institute depends on the caliber and achievements of the students and teachers. The role of a teacher is to be a facilitator in nurturing the skills and talents of students. This magazine is a platform to exhibit the literary skills and innovative ideas teachers and students. Society of Food Technocrats presents the achievements of students and contributions of teachers. We would like to place on record our gratitude and heartfelt thanks to all those who have contributed to make this effort a success. We profusely thank the management for giving support and encouragement and a free hand in this endeavour. Last but not the least we are thankful to all the authors who have sent their articles. We truly hope that the pages that follow will make an interesting read.

Er. Swati Priyadarshi
Assistant Professor
Food Technology

Students Editor's

1. Nitika (FT 8th)
2. Nitish (FT 8th)

Vision of the Department:

To create competent and skilled human recourses involved in the improvement of quality and safety of the rapidly growing food processing sector.

Mission of the Department:

M1: To excel in teaching by offering technical/professional education imbibing ethical and moral values.

M2: To provide knowledge and skills in the areas of food processing, hygiene and safety of processed food products.

M3: To impart students with a vibrant technical knowledge to handle problems by collaborating with food industry.

M4: To promote the research and development activities of students to produce quality food products with the scope.

PEO's of the Department:

PEO1: To provide students with the basic knowledge, skills and use of latest technologies in food science that help in lifelong learning and self education.

PEO2: To acquire theoretical, practical knowledge and Industrial exposure of Food Processing Sector to become a qualified Food Technologist.

PEO3: To provide students with overall competency by inculcate skills, technical writing and communication skills as professionals.

CONTENTS

Sr. No.	ARTICLES
1.	Fish Protein and Its Derivatives
2.	Wet and Dry Processed *Moringa oleifera*
3.	Peach (Prunus Persica): Phytochemicals and Health Benefits
4.	Processing techniques for oriental spices/herbs and condiments
5.	Green strategies for active food packagings
6.	Web marketing in agri-food industry
7.	Meta-analyses of prospective cohort studies
8.	Production of food ingredients with prebiotic potential
9.	Non-thermal decontamination technologies for microorganisms
10.	Peptide hydrogels in food

1. **Fish Protein and Its Derivatives: The Novel Applications, Bioactivities, and Their Functional Significance in Food Products**

Globally, fish processing industries are much concerned to produce fish proteins for the fulfillment of the nutritive requirements of human being. More than 60% fish by-products, including liver, head, skin, roes, viscera, and bones that the richest source of proteins, and these are processed to obtain valuable food products in different industries. Numerous studies have proved that fish proteins have a great potential to reduce the risks of cancer, aging, diabetics, and cardiovascular diseases. Their functional properties such as water and oil holding, film-forming, emulsification, solubility, and gelling capacities, which have increased their importance for the development of functional foods.

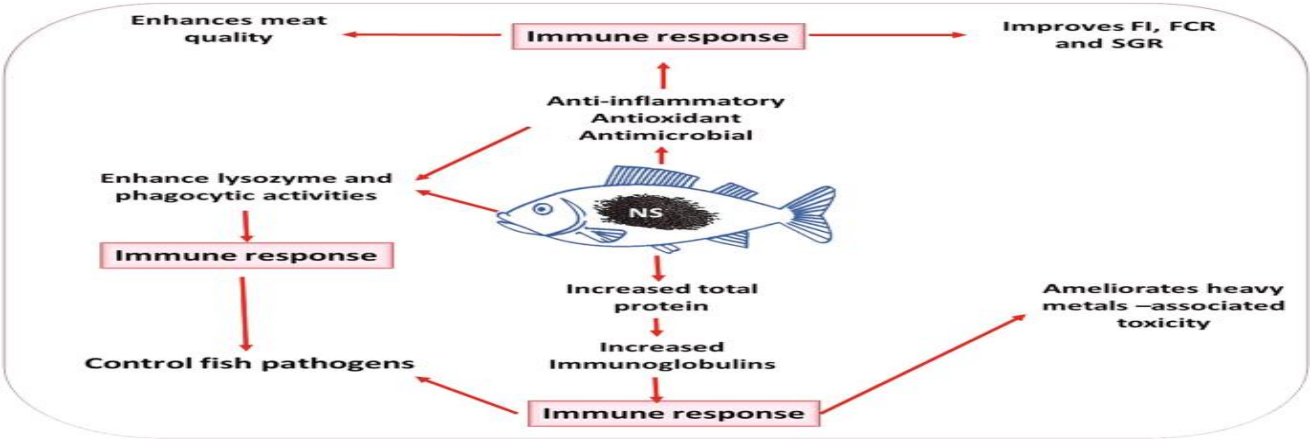

Fig 1.1 Application of Fish Protein and its Derivatives.

Fishes play an energetic role in terms of nutritional, economical, cultural, and recreational benefits in the human society; because these are considered to be the richest protein sources.In developing countries, more than 60 million people rely on fishes and their by-products for their income as well as nutritional needs. The demand for fishing products is increasing due to the surprising increase in the worldwide population. This increase has become more visible in the increasing trade of fish products and better preserving condition and industrialization of fish products. The use of fish protein in a food system as a functional ingredient depends on its ability to stabilize the residual lipids through specific processing approaches. But the serviceable features of proteins like emulsion capacity, water-holding, gelation, and foam stability make their use limited as a food ingredient.Fish-derived ingredients improve the functional and nutritional quality but also negatively affects the sensory attributes of final yields.

Nikhil Choudhary (FT 8th)

2. Nutritional Quality of Wet and Dry Processed *Moringa oleifera* Lam. Leaves

Lam. is a plant species that has found a multitude of applications from health, water clarification and as a food source. In particular, the tree leaves have been consumed in various countries were it is incorporated in the local diet. The advent of food processing technologies have alluded to various methods to process, preserve and extend the shelf-life of fresh produce.

M. oleifera Lam. is reported to be rich in protein, carbohydrates; and micronutrients such as minerals – calcium, manganese, iron; zinc; and vitamins A, C, E and folic acid, and essential amino acids in comparison to spinach (Spinacia oleracea). M. oleifera leaves are in rich protein source, the consumption of the leaves and the subsequent bioavailability of the nutrient(s) are of paramount importance.

Food processing technologies such as solar drying and fermentation are energy efficient and most suited for conditions found in rural communities. In particular, fermentation affords the benefits of enhanced nutrient content, reduction of anti-nutritional factors, inhibition of spoilage microorganisms and consequently extended shelf-life. This presents a winning solution for rural communities. In this case no additional processing aids or equipment is need and thus a nutrient rich and safe food product can be produced economically. Prepared M. oleifera leaves are of often perceived as bitter as a result of the antinutritional factors present in M. oleifera leaves. This compromises the sensory quality of food and such any products that can be prepared from the leaves. This would prove quite a challenge in introducing fermented M. oleifera foods to children. However, through the fermentation the anti-nutritional factors can be reduced.

Fig 2.1 Nutritional Quality of Wet and Dry Processed *Moringa oleifera*.

Nitika (FT 8th)

3. Peach (Prunus Persica): Phytochemicals and Health Benefits

The peach has been part of the human diet for hundreds of years, being a very common fruit consumed worldwide. It is very rich in phytochemicals like phenolic compounds, carotenoids, vitamins, volatiles and organic acids. Phenolics, carotenoids and vitamins are known for their antioxidant properties. They exert a number of beneficial effects on cells through free radical scavenging and by participating in cells' signaling pathways. The phenolic compounds in peach-like quercetin, catechins and cyanidin derivatives have been found to play important roles due to their antioxidant, antimicrobial and anti-inflammatory properties. Evidence has risen about their preventive effects on multiple chronic and age-related diseases such as diabetes, obesity, hypertension, inflammation, cardiovascular, neurodegenerative and oncologic diseases.

Fig 3.1 Phytochemicals and health benefits of peach.

Peach is a very nutritious fruit and was found to be rich in various phenolic compounds, which content distribution depends on the cultivar, conferring the fruit a significant biochemical potential. Its rich content in antioxidants reports as vitamins, carotenoids, phenolic acids and flavonoids are important factors in fruits integrity and commercial quality, as their levels change according to the stage of ripeness, and make the fingerprint for the different cultivars. The peach serves as a good source of natural antioxidant compounds, like phenolics and therefore are the key factors that make peach a good health promotor. Its potential has been proven in several studies, showing a good protective potential against neurodegenerative diseases like Alzheimer's disease and Parkinson's disease, delaying or even preventing the development of such neurodegenerative diseases and many other chronic pathologies like inflammation, atherosclerosis, diabetes, obesity, cardiovascular diseases and certain types of cancer.

4. Recent developments in key processing techniques for oriental spices/herbs and condiments

Oriental spices/herbs and condiments, an indispensable part in oriental human's diet, adds unique flavor and taste to food materials when used. Although the same function (add extra flavor to food products) are somehow served by spices, herbs and condiments, there exists slight differences such as kind, usage and taste among them. Spices and herbs originate from different parts of seasoning plants and have different functions in dishes during their preparation, herbs are generally the leaves from shrubs for adding aroma while spices originate from bark, seeds, root or other vegetable matter for adding flavor and color to foods.

Fig 4.1 Spices and Seasoning Market.

Oriental spices/herbs and condiments have been commonly applied as colour, aroma, flavor enhancing agents and for food storage. The antimicrobial, anticancer, and antioxidant substances contained in oriental spices/herbs and condiments could promote medical and health status of human beings. Therefore, it's of vital importance to take full advantage of them to improve the added-value of food products. Consequently, increasing attention has been focused on their functional application in daily food products such as yogurt, cheeses, butter, ice cream and so on.

5. Green strategies for active food packagings

The emergence of microorganisms resistant to antibiotics and oxidation processes are serious challenges faced by the food packaging industry. Since the packaging can be hurdle technology to food protection and preservation, active packagings receive increasing attention due to the possibility of microbial, quality, and safety control of the product packed.

Carbon nanotubes, graphene oxide, polylactide, and chitosan were the primary materials found increasing antimicrobial and antioxidant features. This work found bioactive compounds as a secondary approach. Both polymers from biomass and nanocarbons can play a role at antibacterial, antifungal, and antioxidant mechanisms. The surface area and pristine sp^2 carbon domains on basal surfaces of graphene oxide contributed with radical stabilizing. The main modes of action proposed for bacterial and fungi control have been membrane disruption and oxidative stress. Although good potential against other pathogens, no work was recovered considering the antiviral activity of nanocomposites. Possibly, one of the significant promising alternatives for preservation of consumer's health is the conventional antimicrobials replacement by bioactive compounds from natural sources associated with nanotechnology, since it proved to favor inhibition of the oxidation and several microbial growths synergistically.

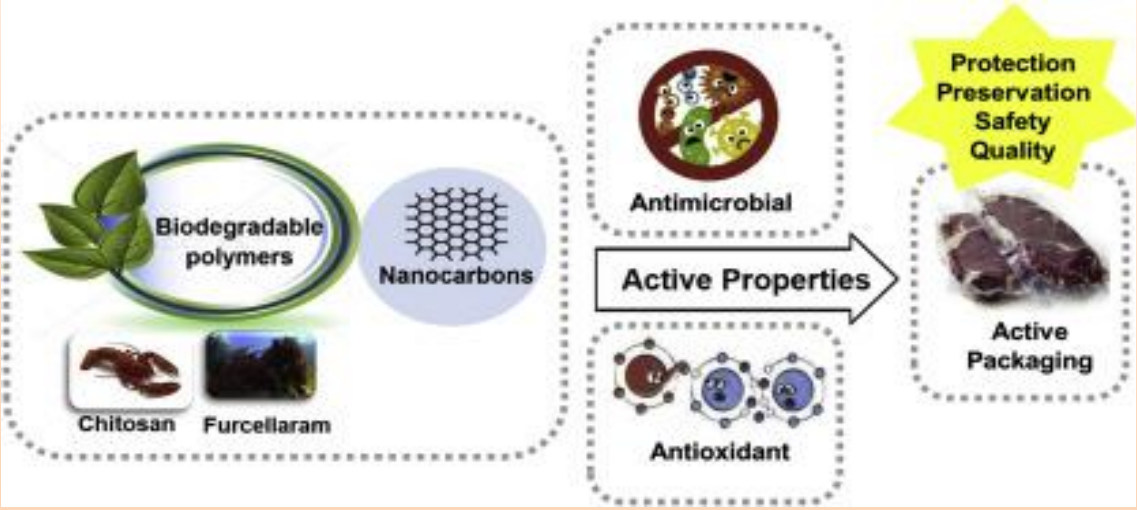

Fig 5.1 Biodegradable polymers for active food packaging.

6. Web marketing in agri-food industry: Challenges and opportunities

Non-technological innovations in marketing are key drivers of competitive advantage of agri-food companies. The progressive and incessant affirmation of the Internet in the world economic panorama imposes the overcoming of the traditional models of marketing. The agri-food companies, in this new context, must think of themselves in the first place, mainly as a provider of information, and must be aware that it is facing a new type of customer, which becomes an active element of the marketing process. In recent years, agri-food companies have started processes of adaptation of their strategic and operational marketing activities with the aim of progressively integrating digital systems and exploiting their potential.

At the beginning of the new product development process there are the needs of the customer, which are understood by the agri-food company through market analysis. The information that derives from it, gives the impulse to the conception and production of products or services that satisfy the identified needs. The agri-food company sets a price, promotes a product or service by informing customers of its characteristics and distributes it on the market. In a modern perspective, however, marketing goes beyond the confines of the agri-food company and the monetary exchange, and extends its range of action to other subjects.

Fig 6.1 Web marketing in agri-food industry.

Aaron Sherpa (FT 8th)

7. Dietary glycemic index, glycemic load, and chronic disease: an umbrella review of meta-analyses of prospective cohort studies

Dietary carbohydrates are the main energy source, and have the largest impact on postprandial blood glucose levels. Dietary carbohydrates on energy intake and blood glucose levels, it has been suggested that diets with high GI and GL values may be associated with a higher risk of chronic disease including type 2 diabetes (T2D) and cardiovascular disease (CVD).

Fig 7.1 Food Sources with low GI and GL values.

Meta-analyses of prospective cohort studies on the association of dietary GI and GL with the risk of chronic disease and found significant positive associations between dietary GI and the risk of CHD, T2D, gallbladder disease, and colorectal, breast and bladder cancers. There was also positive associations between dietary GL and the risk of T2D, CHD, gallbladder disease, and stroke. The certainty of the evidence was rated from very low to low. Further well-designed prospective cohort studies are needed to test the association between glycemic properties of the diet with cancer risk.

Ajay Kumar (FT 8th)

8. Innovative technologies for the production of food ingredients with prebiotic potential: Modifications, applications, and validation methods

A prebiotic is a substrate that is selectively utilized by host microorganisms conferring a health benefit. Prebiotics are capable of maintaining intestinal health, reducing inflammation in gastrointestinal diseases, improving immune function, and preventing colon cancer. Since prebiotics need to be chemically stable in food processing treatments, different industrial alternatives for the production of prebiotic ingredients without altering their characteristics are being explored. Innovative technologies, such as high hydrostatic pressure, ultrasound, microwave, drying and extrusion, are used to process food products using short processing time and low temperature conditions, to extend the shelf life, and to preserve the nutritional value, sensory quality and food safety.

Current trends focus on incorporating prebiotics into food products, contributing to the development of the functional foods market. The concept of prebiotic does not only refer to fiber; it includes other substances that positively impact the microbiota. Prebiotics have different characteristics and behaviors that have to be validated, not only *in vitro* but also *in vivo*, to assess their functionality. Innovation in prebiotic ingredients is not limited to finding new sources; there is also a wide array of technologies that can enable the industry to extract desired compounds or to modify them to enhance their properties.

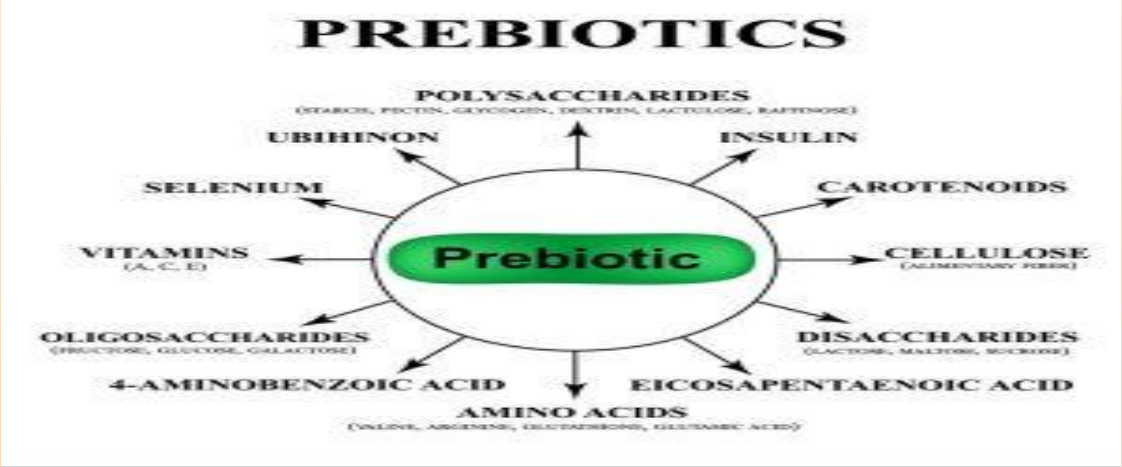

Fig 8.1 Prebiotics as functional food.

Mukul Soni (FT 8th)

9. Recent advances in non-thermal decontamination technologies for microorganisms and mycotoxins in low-moisture foods

Low-moisture foods (LMFs) are generally considered “lower risk” in terms of food safety, however, the frequent foodborne illnesses involved in the consumption of LMFs has heightened the public concern. The low a_w environments also offer considerable protection against microorganisms. Meanwhile, the relatively high contamination risk of mycotoxins in low-moisture foods is a challenge for the food industry. Thermal decontamination techniques usually destroy heat-sensitive nutrients and lower product quality, and they are not adequate for mycotoxins detoxification. Therefore, developing non-thermal decontamination technologies to improve the safety of LMFs is of great interest in both of economics and public health.

Non-thermal decontamination technologies like UV and pulsed light, ionizing irradiation, cold plasma, and ozone have high potential as promising technologies for microbial inactivation and mycotoxin degradation for improving the safety and quality of LMFs. The operating conditions of the treatment, food property, species of microorganisms and mycotoxins are the major determinants affecting the processing efficacy. Further studies are recommended to evaluate the degradant toxicology and its interaction with food components, and particularly scaling-up the technology for commercial applications should be given more attention.

Fig 9.1 Non-thermal decontamination technologies.

Navjot Singh (FT 8th)

10. Prospecting the applications and discovery of peptide hydrogels in food

The interest in peptide hydrogels of natural origin has dramatically increased given the potential applications in several fields -e.g. biomedicine and nanotechnology. Interestingly, despite the current knowledge on protein hydrolysates from food sources, which self-assemble and form gels, the extraction of single peptides that can form hydrogels from food products and/or their application in food and other areas remains poorly explored.

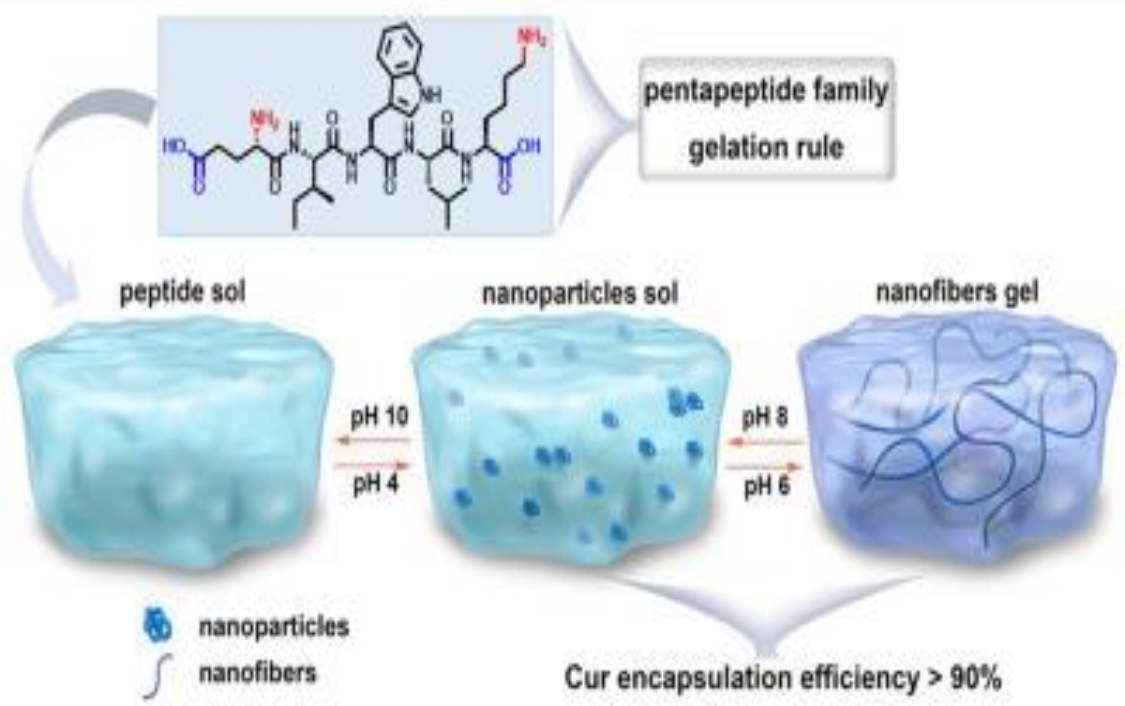

Fig Applications and discovery of peptide hydrogels in food

Food products can be an important source of single peptides that form hydrogels, and these can find applications in food science and other areas. However, research in this area is in its infancy and its progress is limited due in part to the lack of 1) tools that will allow one to predict peptide fragments within a food protein that can self-assemble and form gels and 2) efficient peptide purification protocols. Therefore, more research will have to be directed on these areas in conjunction with optimization of recombinant, and