



# Department Of Food Technology

Society of Food Technocrats  
2023

## HEALTHY FOODS



Bhai Gurdas Institute of Engineering and  
Technology, Sangrur, Punjab

# Message



**Dr. Guninderjit Singh Jawandha**  
**Chairman**  
**Bhai Gurdas Group Of Institutions**

I am delighted to have the opportunity to release "Technomantra", the annual college magazine. In this era of cut throat competition, apart study. One need to have the holistic development of personality & this is our prerogative to chisel our 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 "Technomantra". 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 'Technomantra'. 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

# Message



**Dr. Ashok Kumar**  
**Head of Department**  
**Food Technology**

I am happy that department of Food technology is publishing yet another issue of “Technomantra 2019” 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 talents 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. Ashok Kumar

Head of Department Food Technology

# Message



**Er.Suhail Ahmad**  
**Assistant Professor**  
**Food Technology**

It gives us great pleasure to bring you another issue of “Technomantra”, 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. Technomantra 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. Suhail Ahmad  
Assistant Professor  
Food Technology

Students Editor's

Simranjeet Kaur(FT7th)

MAHIR KUMAR (FT7th)

**Vision of the Department:**

To create competent and skilled human resources 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 imbued with 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.

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## 1. Pumpkin Seeds and its role as a Functional Food Ingredient:

Pumpkin is a fruit vegetable belonging Cucurbitaceae family grown in Asian countries. (Tindall,1983). It is the national vegetable of India. Its popularity is due to its use for decoration purposes in the Halloween season. Besides its aesthetic value, the fruit is compactly packed with functional nutrients.

The World Health Organization (WHO) strongly recommends increasing potassium intake to at least 3500 milligrams per day for adults. Consuming one-quarter cup of pumpkin seeds in addition to pumpkin squash provides an additional 8.5 grams of protein, 4.5 grams of heart-healthy monounsaturated fat, 155 milligrams of magnesium and B Complex vitamins except for vitamin B12, which only comes from animal products.

Pumpkins are a major source of nutrients, proteins, phytosterols, polyphenols, unsaturated fatty acids, tocopherols, cucurbitacin's and also other essential minerals. One cup of cooked pumpkin provides over 400% of the daily value for vitamin A and an average of 560 milligrams of potassium, seeds contain a high amount of potassium (K) and low in sodium (Na).

**Nutrient-rich:** Seeds are the major source of magnesium, iron, zinc and copper, essential minerals for various body functions.

**Heart health:** High magnesium content supports heart health by regulating blood pressure and reducing the risk of cardiovascular diseases and stroke.

**Immune support:** Zinc in pumpkin seeds plays a crucial role in immune function, helping the body fight infections and illnesses.



fat food stuffs. It also possesses good foaming properties and can act as thickening agent and therefore has huge potential in the Bakery Industry, (Due, 2016). To increase the shelf-life or in case of long-term storage after cultivation of *T. titanicus*, it can be treated by irradiation with Co-60(0.5 kGy), (Qiang et al, 2005).



Simranjeet kaur (FT7th)



## 2. How Termite Mushrooms can aid in addressing Challenges of Food Security in India

India is a land of diversity in terms of culture, language, geography, weather conditions and food habits. Even after food diversification, the Global Hunger Index Score of India recorded in the year 2022 has been 29.1, which is regarded as “serious” (Global Hunger Index, 2022). India stands at 107th position on Global Hunger Index out of 121 countries and remains among the top 15 countries with high hunger indices. In

some countries including India, the rate may worsen in 2023. Most possible reasons may be conflict among countries, climate change, low economic growth rate post COVID-19, Russia-Ukraine war, all of which has led to increase in the prices of food, fuel and fertilizers, (Report on Hunger Index, 2022). The higher the hunger index, greater are the chances of malnutrition in children.



In view of the same, the focus has to shift towards food types that can fulfill the hunger needs and nutrition requirements of large families in a cost-effective manner. One such food type is a fungus – *Termitomyces titanicus* (mushrooms). *Termitomyces titanicus* is the world’s largest edible mushroom as well as largest organism in the world having a cap diameter of around 1m (Ghorai et al, 2011) 3 feet wide in total (a report on *T. titanicus*). The color of the cap is grayish with dark brown patches (Kumari et al, 2022).

The texture of mushroom is meaty with smoky and savory flavour. The amount of nutrients found in *T. titanicus* is represented in Table below.

**Table 1 - Nutritional Content of *T. titanicus***

Sr. No.	Nutrients	Amount (%)
1.	Protein	23.75
2.	Fat	3.58
3.	Moisture	11.59
4.	Ash	7.4
5.	Total carbohydrates	54.7
6.	Energy value	345.90 kcal/ 100 g

*T. titanicus*, being the largest mushroom species can be a boon to the entire family, as using one mushroom could fill the stomach of at least 15-20 members, which helps in reducing hunger in a cost-effective manner, particularly for large families. It is rich in nutrients and contains medicinal properties that can not only reduce the problems of malnutrition, but also other diseases as mentioned above. *T. titanicus* can be a good substitute for low fat food stuffs. It also possesses good foaming properties and can act as thickening agent and therefore has huge



Sonali Saini (FT7th)

### 3. Nutritional and Functional Properties of Millets:

Millets are a group of cereal grains that belong to the Poaceae family, commonly known as the grass family. They constitute an important source of food and fodder for millions and play a vital role in the

Ecological and economic security of India. These millets are also referred to as 'coarse cereals', 'nutricereals', 'cereals of the poor', etc. Millets are highly adaptive to a wide range of environmental conditions such as floods, drought, etc. They have minimum requirements for water, fertilizers and pesticides. They are rich in proteins, vitamins and minerals. They have a low glycemic index, making them ideal for people with diabetes. Millets are a good source of iron, zinc and calcium.



#### Sorghum:

Sorghum is the fifth most-produced cereal crop in the world. It is low in fat, but is rich in protein, B vitamins, fibre and micronutrients, all of which contribute to good health. This grain is a good source of plant based protein.

#### Pearl Millet (Bajra):

Pearl millet is also known as bajra and is grown in semi-arid regions, primarily in Africa and Asia. It is one of the eight main cereals in the world. It is well adapted to low rainfall, low soil fertility and high temperatures. This is one of the four most important cereals, which is rich in iron and zinc with high content of antioxidants.

#### Finger Millet (Ragi):

Finger Millet is also known as ragi and is a type of small-sized millet that requires a large area for cultivation and comes under the taxonomic family Poaceae. Because of its high nutritional content, it is considered as a special food supplement. Finger Millet is a great source of calcium along with antioxidants and phytochemicals.

#### Foxtail Millet:

This is an annual grass plant belonging to the tribe Paniceae of the Poaceae family. It is also known as Italian or German millet and is categorized under small millet due to its small size. It is grown as a staple food in China, India, Myanmar, Russia and Eastern Europe. Foxtail millet contains special proline-rich, alcohol-soluble proteins called setarins constituting almost 60% of millet, containing fewer amounts of disulphide cross-linked proteins.

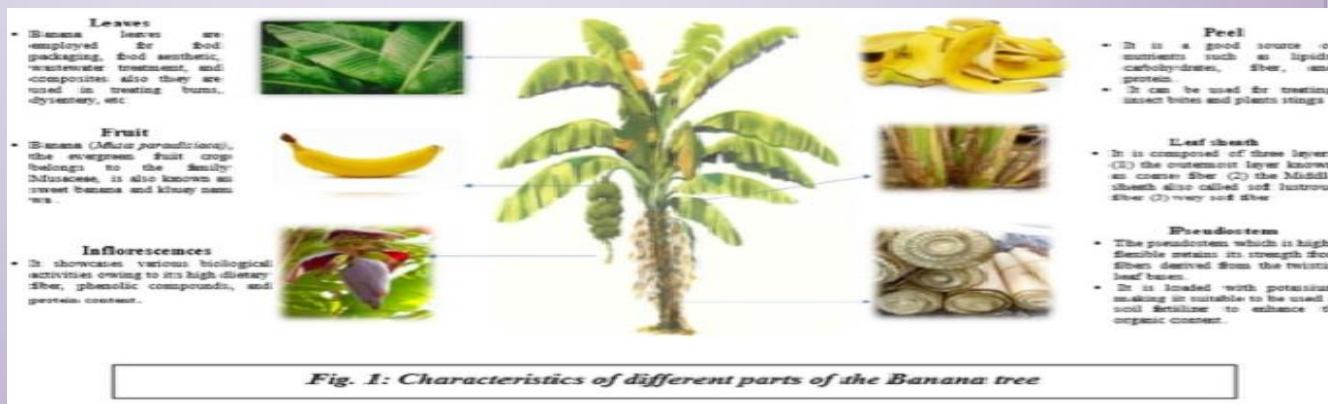
Millets are becoming a part of our lives and in the future, we are going new changes to experience in their utilization. The advanced technology, processing methods and research findings show that millet is going to take the position of cereals like rice, wheat, maize, etc. These above mentioned properties are now noticed by food technologists and scientists to make use of them, which can help in ensuring a sustainable future.



Mahir (FT7th)

#### 4. Nutritional Significance of Banana Pseudostem and its Food Applications:

Banana (*Musa paradisiaca*), the evergreen fruit crop belonging to the family Musaceae, is also known as sweet banana and kluay nam wa (Gupta et al., 2022; Ali et al., 2022). The yield of bananas is highly prolific and attains a superior rank globally. The production of bananas was reported to be 116 million tons in 2017-2019 and 121 million in 2021, contributing to around 16% of the production of the total fruit including grapes, citrus fruits and apples. (Singh et al., 2016; Ramirez-Bolanos et al., 2021; Gupta et al., 2022; Zou et al., 2022) Pseudostem has a rich nutritional profile encompassing a range of nutritional components such as minerals, amino acids, dietary fibre, lipids, antioxidants and polyphenols that demonstrate various health-enhancing qualities. As per the previous research studies, it has been revealed that pseudostem is a good source of macronutrients including potassium, calcium and magnesium. The presence of dietary fibre in pseudostem helps in detoxifying the body by eliminating waste products.



To conclude, pseudostem which is considered agricultural waste can be utilized in food industries for the formation of economically feasible products. The fortification of pseudostem is considered an optimal

technique to improve the nutritional profile of food, due to the comprehensive nutritional profile which makes the food more valuable. Moreover, including banana pseudostem in the diet can prevent the occurrence of many diseases like diabetes, cardiovascular disease, cancer, obesity and renal stone, since it is a rich source of dietary fibre, antioxidants, minerals and an adequate number of amino acids. This article will open a new door for researchers and food industrialists to explore the scope of utilizing this highly nutritious waste product.



Priness (FT7th)

## 5. Utilization Coffee Grounds of Spent- “A Profitable Coffee Waste”

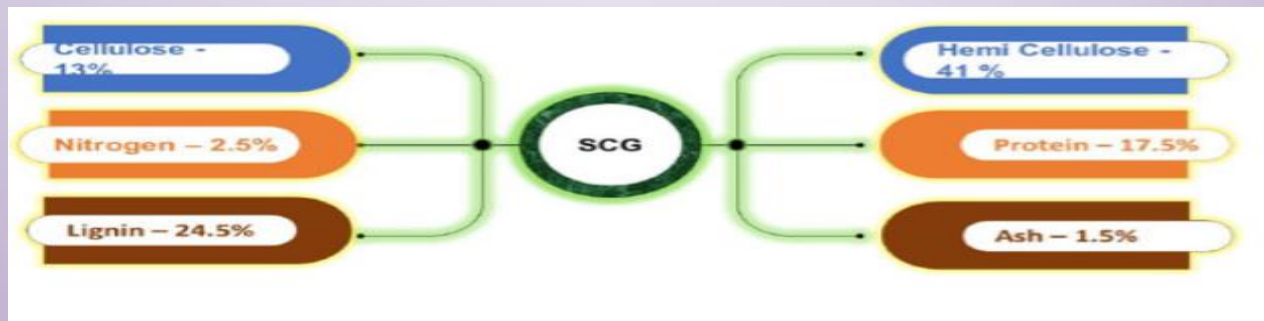
Coffee bean is currently the second highest commodity that is being traded globally, apart from being the most widely consumed beverage. At the same time, the brewing of coffee beans results in a small number of specified compounds and generates a huge amount of leftovers in the form of coffee grounds (SCG), which are the mashes left after extracting the desirable composites in the brewing process. Approximately, for every 1 kg of coffee, around 900 g of SCG is obtained, (Soares et al., 2015). Every year, around sixty lakh tonnes of grounds of coffee are produced worldwide.

### Composition of Spent Coffee Grounds (SCG):

Polysaccharides, particularly cellulose and hemicellulose are the most abundant component of SCG, accounting for roughly half of its dry mass. The vital components of hemicellulose sugars are mannose, galactose and arabinose, while glucose is the important component of cellulose. Lignin and protein are the next most abundant compounds, accounting for roughly 20% of total dry mass. Also, SCG contains a significant percentage of oil, with several studies reporting oil content of over 15% by dry mass, (McNutt & He, 2019).

### SCG in the Food Industry:

The large quantity of organic compounds found in used coffee grounds, (SCG) makes it appropriate for use. An earlier innovation investigated extracting specific ingredients, like terpenes, oil, flavour and alcohol to extracting specific ingredients, like terpenes, oil, flavour and alcohol to create products with high value. But leftovers from the coffee bean- processing industry can be used as essential bioactive components in the processing industry can be used as essential bioactive components in the food and food-related industries.



### Application of SCG Compounds in the Food Industry:

#### Caffeine:

Coffee also referred to as 1,3,7-trimethylxanthine, is the most well-known substance in coffee and coffee-related products and ingredients.

#### Carbohydrates:

Carbohydrates in the form of polysaccharides- galactomannans and arabinogalactans-have excellent usage in emulsion stabilizers and stabilizers in milk and dairy products, fruit-based water gels, powdered goods and as a good formulation for baby milk, seasonings, soups and sauces.

#### Lipids:

Depending on the coffee species, spent coffee grounds contain nearly 10 to 15%. Sterols make up approximately 5.4% of the lipids in the Arabica coffee variety,(Campos-Vega et al., 2015).

Spent Coffee Grounds have a significant potential for reuse as a renewable supply of lipids, phenolic bioactive chemicals and carbohydrates for the manufacture of various value-added goods according to their composition. SCGs have the advantage of not competing with food items and being produced in quantities that are industrially and commercially acceptable enough to consider subsequent reuse.



Sahil Sharma (FT7th)

## 6. Probiotic Microorganisms in your Food! What's really Changed Today?

### Why Probiotics?

Probiotics are “live microorganisms that offer a health benefit on the host when administered in suitable numbers” (FAO/WHO 2001). They're frequently found in fermented milk, yoghurt and cheese. Functional foods such as probiotics and prebiotics make up the largest segment of the Functional Foods Market in Europe, Japan and Australia. These can be ingested as either fermented or unfermented foods or as dietary supplements (products in powder, capsule or tablet forms). Currently the most prevalent method is to consume probiotic organisms through food products. The majority of probiotic food products are classified as functional foods and they make up a large portion of that category. The purpose of this article is to provide an Overview of Probiotic Foods and the factors responsible for survival of Probiotic Microorganisms and Recent Technological Advances which are helping maintain their viability during processing, packaging and storage.

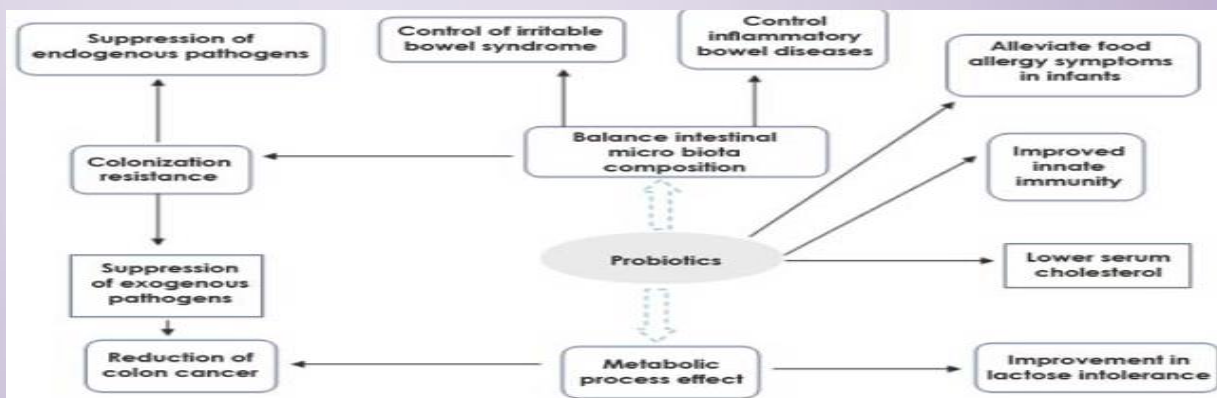


Fig 1: Probiotics Consumption and their Health Benefits

### Traditional Probiotic Foods:

Traditional fermented/preserved foods and beverages are known to be related to some ethnic practices and civilizations. They are seen as playing an important role in ancient cultures that is widely recognized across countries and continents. Previously, traditional foods were made without taking into account the science of the microbe's application and role.

Table 1: Some Traditional Probiotic Foods of Different Countries			
Product	Probiotic	Food Product	Country
Adai Agbelima	LAB <i>Lb. plantarum</i> , <i>Lb. brevis</i> , <i>Lb. fermentum</i> <i>Leuc. mesenteroides</i>	Cereal, legume Cassava	Thailand south east Asians
Atole Ben-saalga	LAB LAB	Maize Pearl millet	Kenya, Philippines India
Probiotic ice cream	<i>L.acidophilus</i> , <i>Bifidiobacterium animalis</i>	Sheep milk	India
Yoghurt	<i>Lactobacillus delbrueckii</i> , <i>Streptococcus thermophilus</i>	Cow milk, Yak	India

Several studies have concluded that the use of probiotics in dairy-based foods and beverages is preferable. As a result, the dairy industry is expanding practically in every country and continent. Non-dairy probiotics, which include fermented cereals, soy meat, fruits and vegetables are known for their flavour and refreshing nature. They are also high in minerals, vitamins and antioxidants.



Breej Mohan (FT7th)

## 7. Nutraceutical Gummies: A Novel Formulation to Dispense Functional Nutrition:

Nutraceuticals are based on foods or components of foods that have a major role in altering and sustaining optimal physiological function in the human body. The distinction between food and medicine is being bridged by nutraceuticals. They possess the potential for enhancing nutrition, safety, and therapeutic outcomes. Nutraceuticals have attracted a lot of attention in recent years. Recently, processed foods with high functional nutrition value have become the prime focus of consumers concerning their healthy eating habits. The consumer trend has changed to favour food products that are providing HDL cholesterol, vitamins, dietary fibre, phytopigments, and minerals and are also facilitating by reducing the intake of calories and triglycerides. Nutraceutical gummies are agar-agar or gelatinous sugar-based formulations possessing Phyto-components having functional immunity, detox, sleep, digestion, lifestyle supplements and children's calcium requirements have all benefitted greatly from gummies.



Gummy nutrient supplements or Nutraceutical Gummies are more desirable among a class of population, owing to their aesthetic acceptance and delivery convenience. Gummies with nutritional supplements facilitate the dispensing of vital essential micronutrients to the generation of the 21st century that wants to maintain a healthy lifestyle with ease. A variety of lifestyle amendments viz. digestive health issues, general cardiac problems, micronutrient deficiencies and gut-microbiome issues can be supported with such formulations. In addition to vitamins and minerals, macronutrients like proteins, omega-3 fatty acids and DHA diets can also be supplemented. To increase the gummies' appeal to customers, a variety of active substances and plant-based or microorganism-based food additives can be added.



Dharminder (FT7th)

## 8. How Termite Mushrooms can aid in addressing Challenges of Food Security in India.



India is a land of diversity in terms of culture, language, geography, weather conditions and food habits. Even after food diversification, the Global Hunger Index Score of India recorded in the year 2022 has been 29.1, which is regarded as “serious” (Global Hunger Index, 2022). India stands at 107th position on Global Hunger Index out of 121 countries and remains among the top 15 countries with high hunger indices. In some countries including India, the rate may worsen in 2023. Most possible reasons may be conflict among countries, climate change, low economic growth rate post COVID-19, Russia-Ukraine war, all of which has led to increase in the prices of food, fuel and fertilizers, (Report on Hunger Index, 2022).

In view of the same, the focus has to shift towards food types that can fulfill the hunger needs and nutrition requirements of large families in a cost-effective manner. One such food type is a fungus – *Termitomyces titanicus* (mushrooms). It is a gilled mushroom that belongs to genus *Termitomyces*, (Kamat, 2016). The mushrooms of this genus grow in symbiotic relationship with termites- *Odontotermes obesus*, *O. feae*, *O. brunneus*, etc., (Aanen et al, 2002).

### **Climatic conditions for *Termitomyces titanicus*:**

*Termitomyces titanicus* requires cold temperature and high rainfall for its cultivation. It mainly grows in winter season with soil rich in carbon, nitrogen, magnesium and calcium. (*T. titanicus* report, 2023)

### **Nutritional Value and Health Benefits of *T. titanicus***

**Table 1 - Nutritional Content of *T. titanicus***

Sr. No.	Nutrients	Amount (%)
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Harkomaljot Singh (FT7th)







