

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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An AICTE Activity Points Report On

“FOOD PRESERVATION/PACKAGING”

Submitted in partial fulfillment required for award of the Graduation Degree

Bachelor of Engineering
In
Computer Science and Engineering
Submitted by

KAVYA R NAIK

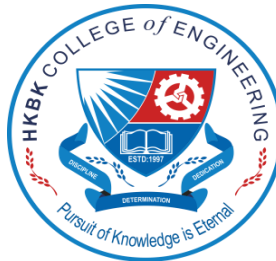
1HK21CS063

Under the guidance of

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2024-25



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Certificate

Certified that the AICTE Activity Points entitled **FOOD PRESERVATION/PACKAGING**", carried out by **Kavya R Naik (1HK21CS063)** is a Bonafide student of **HKBK COLLEGE of ENGINEERING**, in partial fulfillment for the award of **Bachelor of Engineering** in **Computer Science and Engineering** of the **Visvesvaraya Technological University**, Belagavi, during the year **2024-25**. It is certified that all corrections/suggestions indicated for AICTE Activity Points have been incorporated in the report deposited in the departmental library.

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Date : 02/05/2024

TO WHOMSOEVER IT MAY CONCERN

Subject : AICTE ACTIVITY ON FOOD PRESERVATION /PACKING.

This is to certify the below students studying in **HKBK COLLEGE OF ENGINEERING** has successfully completed the **AICTE ACTIVITY** in our store by making us understand the importance of **FOOD PRESERVATION/PACKING**.

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DECLARATION

I hereby declare that the AICTE activity work entitled as “**FOOD PRESERVATION/PACKAGING**” is a record of an original work done by me under the guidance of Prof. HUSNA TABASSUM, Department of Computer Science and Engineering, HKBK College of Engineering, and this activity work is submitted in the partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering in Computer Science and Engineering. The result embodied in this has not been submitted to any other University or Institute for the award of any degree.

1HK21CS063

KAVYA R NAIK

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Finally, I thank Almighty, all the faculties of CSE Department, our family members and friends for their constant support and encouragement in carrying out the Activity work.

1HK21CS063 KAVYA R NAIK

HKBK COLLEGE OF ENGINEERING

VISION

To empower students through wholesome education and enable the students to develop into highly qualified and trained professionals with ethics and emerge as responsible citizen with broad outlook to build a vibrant nation

MISSION

- To achieve academic excellence in science, engineering and technology through dedication to duty, innovation in teaching and faith in human values.
- To enable our students to develop into outstanding professional with high ethical standards to face the challenges of 21st century.
- To provide educational opportunities to the deprived and weaker section of the society to uplift their socio-economic status.

DEPARTMENT VISION AND MISSION

VISION

To advance the intellectual capacity of the nation and the international community by imparting knowledge to graduates who are globally recognized as innovators, entrepreneur and competent professionals.

MISSION

- To provide excellent technical knowledge and computing skills to make the graduates globally competitive with professional ethics.
- To involve in research activities and be committed to lifelong learning to make positive contributions to the society.

PROGRAM OUTCOMES(POs)

- PO-1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO-3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO-5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO-6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO-8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO-9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-1. Problem-Solving Skills: An ability to investigate and solve a problem by analysis, interpretation of data, design and implementation through appropriate techniques, tools and skills.

PSO-2. Professional Skills: An ability to apply algorithmic principles, computing skills and computer science theory in the modelling and design of computer-based systems.

PSO-3. Entrepreneurial Ability: An ability to apply design, development principles and management skills in the construction of software product of varying complexity to become an entrepreneur.

ABSTRACT

Food preservation and packaging are essential practices that significantly impact food safety, quality, and sustainability. This report explores the various methods of food preservation, including canning, freezing, drying, fermentation, pickling, and smoking, each serving to extend shelf life and maintain nutritional value while preventing spoilage. Additionally, it examines innovative packaging techniques such as vacuum packaging, modified atmosphere packaging (MAP), aseptic packaging, and biodegradable options, which enhance food longevity and reduce environmental impact. The importance of these practices is underscored by their role in minimizing food waste, safeguarding against contamination, and providing convenience for consumers. As global food demand rises, effective preservation and packaging methods become increasingly vital in ensuring food security and reducing waste across the supply chain. The report also highlights the environmental considerations associated with packaging materials and the need for sustainable solutions. By promoting eco-friendly packaging and educating consumers on responsible consumption, the food industry can address pressing environmental concerns. Ultimately, the integration of innovative preservation techniques and sustainable packaging solutions is crucial for fostering a healthier planet and society. As we navigate challenges related to food waste and sustainability, prioritizing food preservation and packaging will enhance our quality of life while contributing to a more sustainable future for generations to come.

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CHAPTER – 1

INTRODUCTION

1.1. FOOD PRESEVATION AND PACKAGING

Food preservation and packaging are critical processes that play a significant role in extending the shelf life and ensuring the safety of food products. These activities are essential not only for maintaining the nutritional value of food but also for preventing spoilage and reducing waste. This document provides an in-depth exploration of various methods and practices involved in food preservation and packaging, highlighting their importance and applications.

1.2. FOOD PRESERVATION METHODS

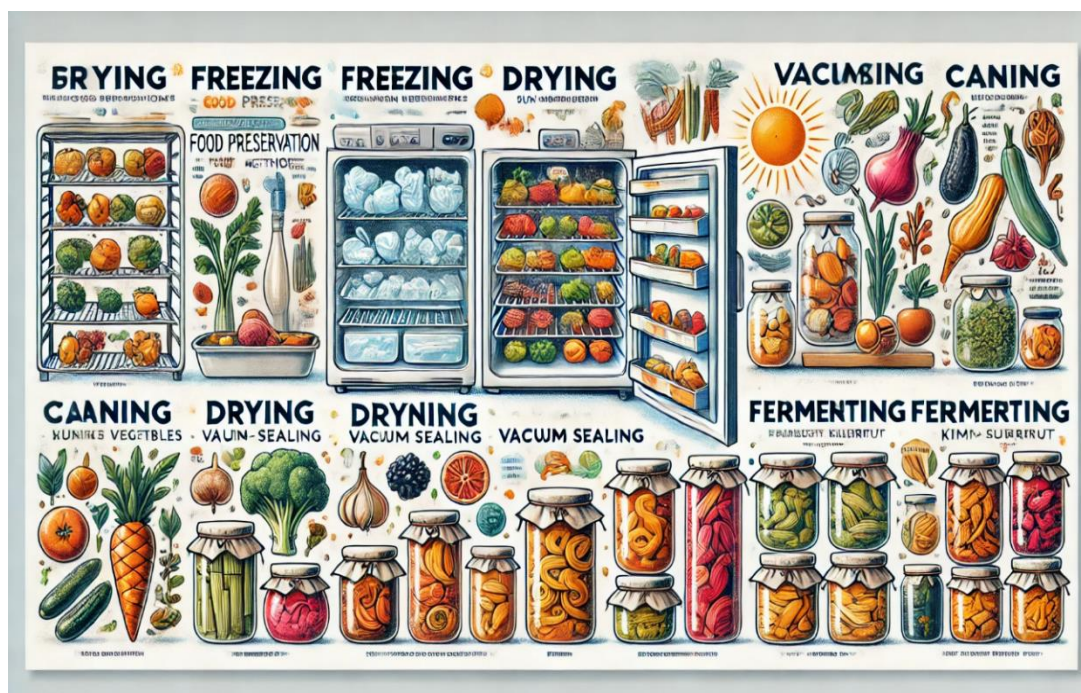


Figure 1 : From Farm to Fridge: A Visual Guide to Food Preservation

Food Preservation Methods includes:

1. **CANNING:** Canning is a widely used method that involves sealing food in airtight containers and heating them to destroy harmful microorganisms. This technique is particularly effective for preserving fruits, vegetables, and meats, allowing them to be stored for extended periods without refrigeration. The canning process also helps retain the food's flavour and nutritional content.
2. **FREEZING:** Freezing is another popular preservation method that slows down enzyme activity, which is responsible for food spoilage. By lowering the

temperature, the growth of bacteria and molds is inhibited. This method is versatile and can be applied to a variety of foods, including fruits, vegetables, and prepared meals, making it a convenient option for consumers.

3. **DRYING:** Dehydration is a preservation technique that removes moisture from food, thereby preventing the growth of spoilage-causing microorganisms. Dried foods, such as fruits, herbs, and jerky, have a long shelf life and are lightweight, making them ideal for storage and transportation. This method also concentrates flavours, enhancing the taste of the preserved items.
4. **FERMENTATION:** Fermentation is a unique preservation process that utilizes microorganisms to convert sugars into acids or alcohol. This not only preserves the food but also enhances its flavour and nutritional profile. Common examples of fermented foods include yogurt, sauerkraut, and kimchi, which are enjoyed for their distinct tastes and health benefits.
5. **PICKLING:** Pickling involves immersing food in vinegar or brine, creating an acidic environment that inhibits spoilage. This method is commonly used for vegetables such as cucumbers, onions, and peppers. Pickled foods are not only preserved but also offer a tangy flavour that many people enjoy.
6. **SMOKING:** Smoking is a traditional preservation method that involves exposing food to smoke from burning or smoldering materials, typically wood. This technique imparts a unique flavour to the food while also acting as a preservative. Smoked meats and fish are popular examples of this method.

1.3. FOOD PACKAGING TECHNIQUES

1. **VACUUM PACKAGING:** Vacuum packaging is a technique that removes air from the packaging before sealing it. This process helps extend the shelf life of food by reducing oxidation and inhibiting microbial growth. It is commonly used for meats, cheeses, and other perishable items.
2. **MODIFIED ATMOSPHERE PACKAGING (MAP):** MAP replaces the air inside the package with a specific gas mixture that slows down spoilage. This method is particularly effective for fresh produce and meats, as it helps maintain their freshness and quality during storage and transportation.
3. **ASEPTIC PACKAGING:** Aseptic packaging involves sterilizing both the food and the packaging separately before sealing them together. This method is often used for dairy products and juices, allowing them to be stored at room temperature without the need for preservatives.
4. **BIODEGRADABLE PACKAGING:** Biodegradable packaging is made from natural materials designed to break down more quickly than traditional plastics. This

type of packaging reduces environmental impact and is becoming increasingly popular as consumers seek more sustainable options.



Figure 2 : Don't Judge a Package by Its Cover... But This One's Pretty Cool!

5. **SMART PACKAGING:** Smart packaging incorporates technology to monitor the condition of the food. Features such as freshness indicators or temperature sensors help ensure optimal quality and safety, providing consumers with valuable information about the products they purchase.

Food preservation and packaging are vital components of the food supply chain, ensuring safety, reducing waste, and maintaining quality. By employing various methods and techniques, we can enjoy a diverse range of foods while minimizing spoilage and extending shelf life. Continued innovation in this field will further enhance our ability to preserve food effectively and sustainably, meeting the demands of a growing population and addressing environmental concerns. As we move forward, it is essential to explore new technologies and practices that will contribute to a more efficient and sustainable food system.

1.4. IMPORTANCE OF FOOD PACKAGING AND PRESERVATION

Food packing and preservation are vital for ensuring the safety, quality, and longevity of food products. With the rising global demand for food, effective packing methods are essential to minimize waste and maintain freshness. Proper food packing safeguards against contamination, spoilage, and physical damage during transportation and storage. Various preservation techniques, including refrigeration, freezing, canning, and vacuum sealing, extend the shelf life of perishable items, allowing consumers to enjoy seasonal products throughout the year. These methods inhibit the growth of harmful bacteria, molds, and yeasts, which can cause foodborne illnesses.

Innovative packing solutions, such as modified atmosphere packaging (MAP) and biodegradable materials, are becoming increasingly popular. MAP modifies the gas composition around the food, enhancing freshness and reducing spoilage, while biodegradable materials promote environmental sustainability by decreasing plastic waste. The significance of food packing and preservation goes beyond individual households; it affects the entire food supply chain. Efficient methods can significantly reduce food waste at all levels, from production to consumption. This not only conserves valuable resources but also bolsters food security by ensuring that more food is available for those in need.



Figure 3 : Importance of food preservation

CHAPTER – 2

PROJECT IMPLEMENTATION

2.1. IMPORTANCE OF FOOD PRESERVATION AND PACKAGING

Food preservation and packaging are essential practices that play a crucial role in our daily lives. They not only ensure the safety and longevity of food products but also contribute to reducing food waste, maintaining nutritional value, and enhancing convenience for consumers. This report aims to explore the significance of food preservation and packaging, highlighting their impact on health, economy, and the environment.

2.2. UNDERSTANDING FOOD PRESERVATION

Food preservation refers to the methods and techniques used to prevent food spoilage and extend its shelf life. Various methods, including refrigeration, freezing, canning, drying, and fermentation, are employed to inhibit the growth of microorganisms and enzymatic reactions that lead to food deterioration. The importance of food preservation can be summarized in the following points:

- **Safety:** Preserving food helps eliminate harmful bacteria and pathogens, reducing the risk of foodborne illnesses. Techniques such as pasteurization and canning ensure that food remains safe for consumption over extended periods.
- **Nutritional Value:** Proper preservation methods help retain the nutritional content of food. For instance, freezing vegetables shortly after harvest locks in vitamins and minerals, making them a healthy option even months later.
- **Economic Benefits:** By extending the shelf life of food products, preservation reduces the frequency of purchases and minimizes food waste. This is particularly important in households and businesses where food costs can significantly impact budgets.
- **Seasonal Availability:** Preservation allows consumers to enjoy seasonal fruits and vegetables year-round. Canning and freezing enable the storage of produce at its peak freshness, providing access to a diverse diet regardless of the season.

2.3. THE ROLE OF FOOD PACKAGING

Food packaging serves as a protective barrier that safeguards food from external factors such as moisture, light, and contaminants. It plays a vital role in food preservation and has several key functions:

- **Protection:** Packaging protects food from physical damage, spoilage, and contamination during transportation and storage. It helps maintain the integrity of the product, ensuring that it reaches consumers in optimal condition.
- **Extended Shelf Life:** Innovative packaging technologies, such as vacuum sealing and modified atmosphere packaging, help extend the shelf life of perishable items. These methods reduce oxygen exposure and inhibit microbial growth, allowing food to stay fresh longer.
- **Information and Labeling:** Packaging provides essential information to consumers, including nutritional facts, ingredient lists, and expiration dates. This transparency helps consumers make informed choices about their food, promoting healthier eating habits.
- **Convenience:** Modern packaging designs enhance convenience for consumers. Single-serving packages, resealable bags, and microwaveable containers cater to busy lifestyles, making it easier to prepare and consume food.

2.4. ENVIRONMENTAL CONSIDERATIONS

While food preservation and packaging offer numerous benefits, it is essential to consider their environmental impact. The production and disposal of packaging materials can contribute to pollution and waste. However, sustainable practices are emerging to address these concerns:

- **Eco-Friendly Packaging:** The development of biodegradable and recyclable packaging materials is gaining traction. These alternatives reduce the environmental footprint of food packaging and promote sustainability.
- **Reducing Food Waste:** Effective preservation and packaging can significantly reduce food waste, which is a major environmental issue. By extending the shelf life of food, we can minimize the amount of food that ends up in landfills, thereby decreasing greenhouse gas emissions.
- **Consumer Awareness:** Educating consumers about the importance of food preservation and sustainable packaging practices can lead to more responsible consumption habits. Encouraging the use of reusable containers and proper storage techniques can further reduce waste.

2.5. RECOMMENDATIONS

- Promote awareness campaigns on the importance of food preservation and sustainable packaging.
- Encourage the adoption of eco-friendly packaging solutions in the food industry.

- Support research and development of innovative preservation techniques that enhance food safety and quality.
- Advocate for consumer education on proper food storage and waste reduction practices.

2.6. ACTIVITY SNAPSHOTS

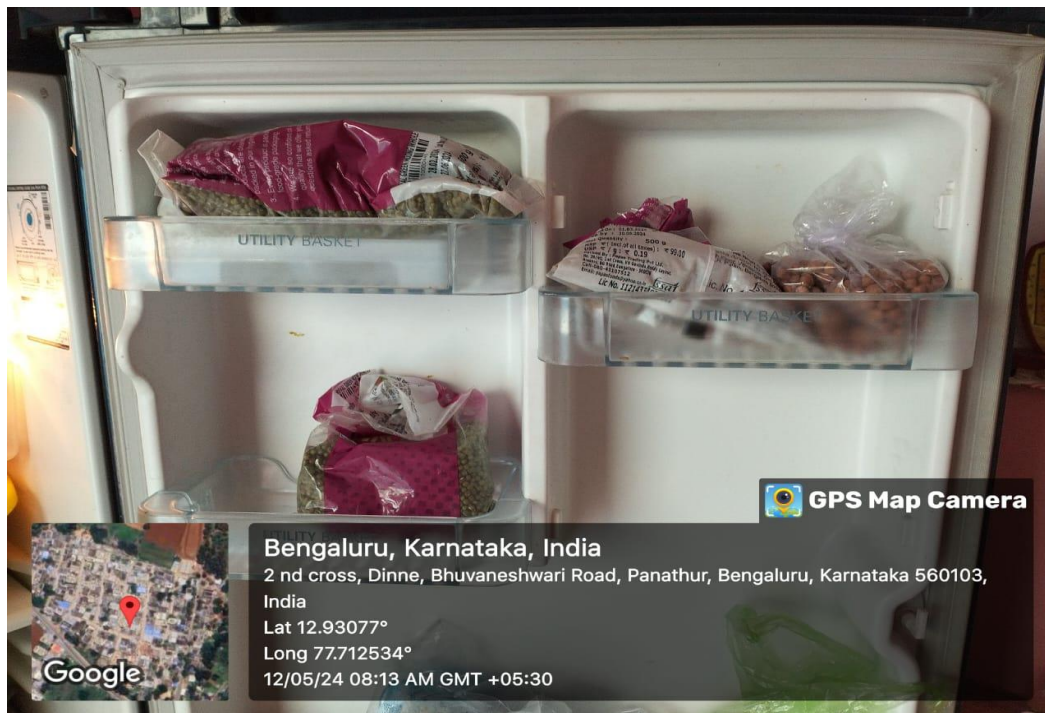


Figure 4 : My fridge is my pantry. And it's always stocked.

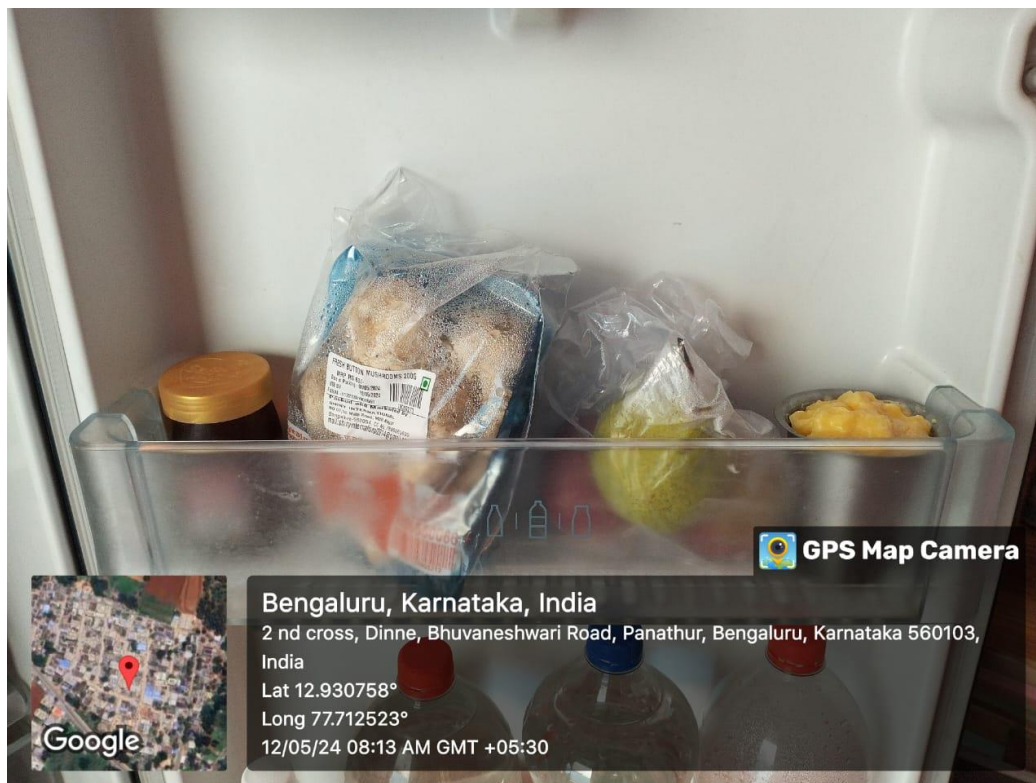


Figure 5 : Keeping food fresh and safe



Figure 6 : Street food: A testament to the ingenuity of food preservation

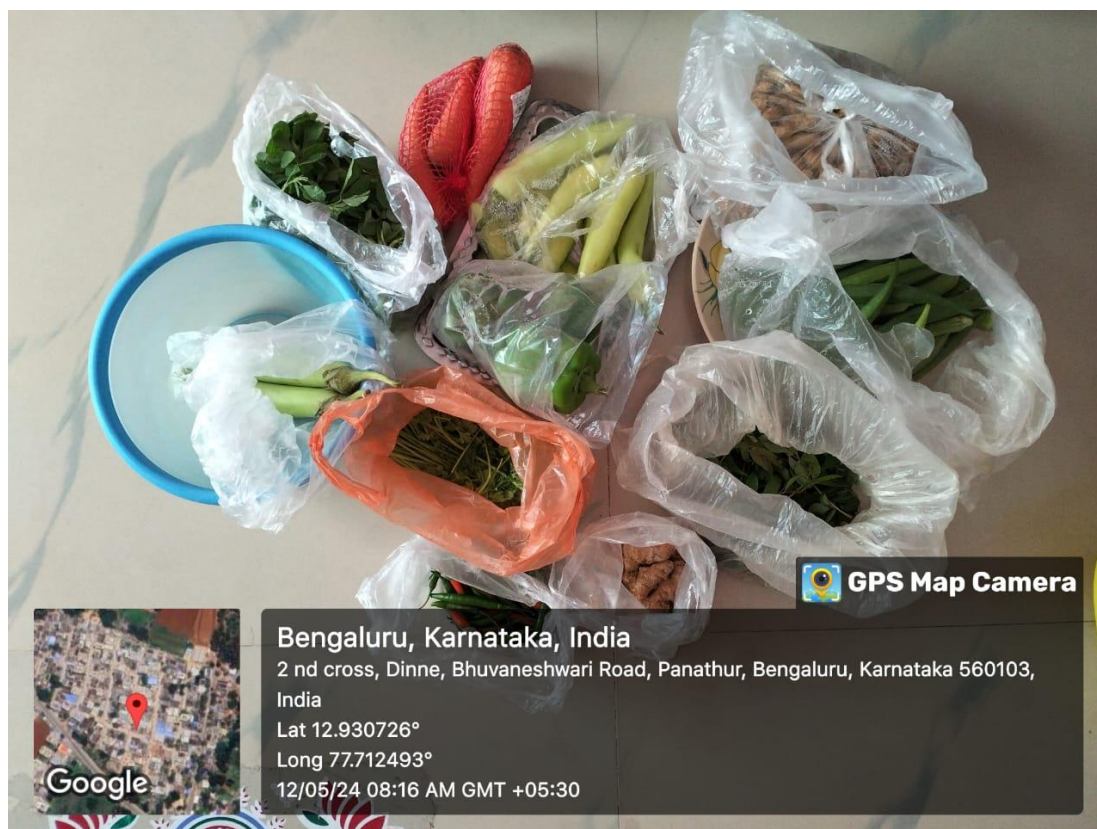


Figure 7 : The colours of a fresh market haul



Figure 8: Proper packaging = longer shelf life. #foodpreservationtips

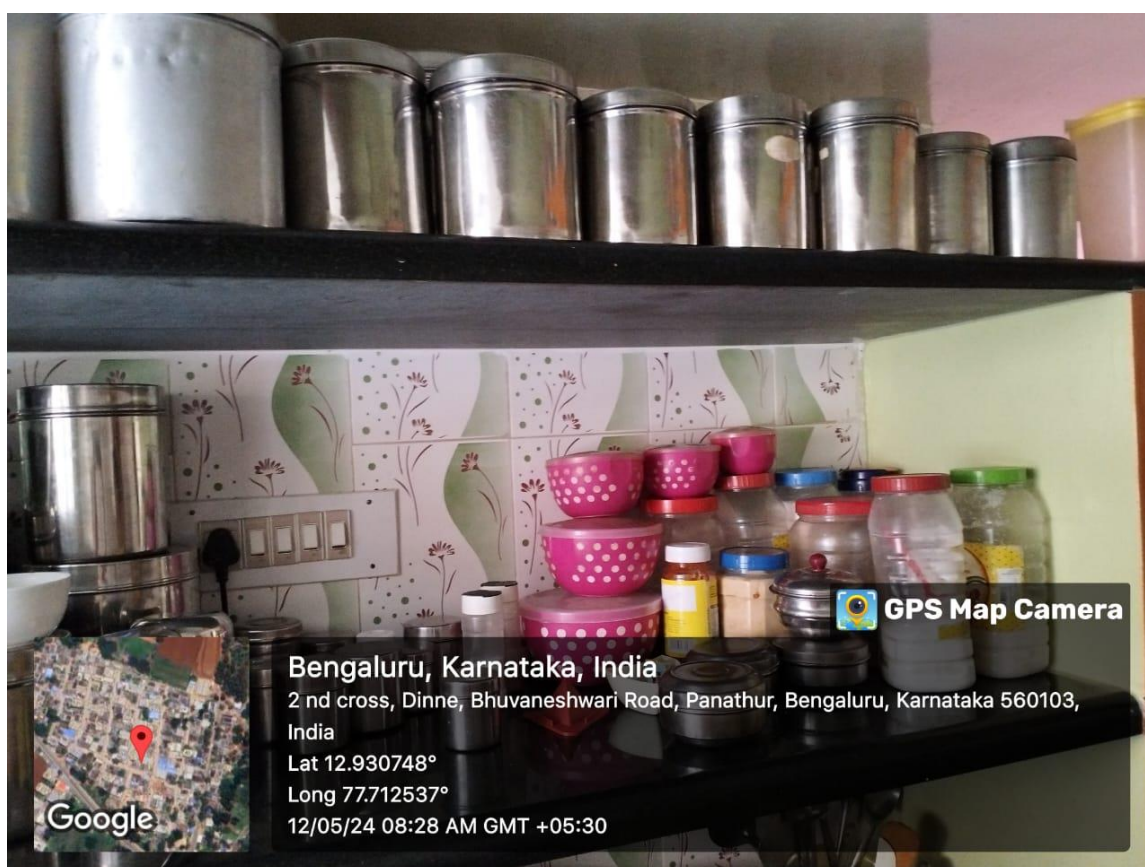


Figure 9 : Keeping food safe for everyone

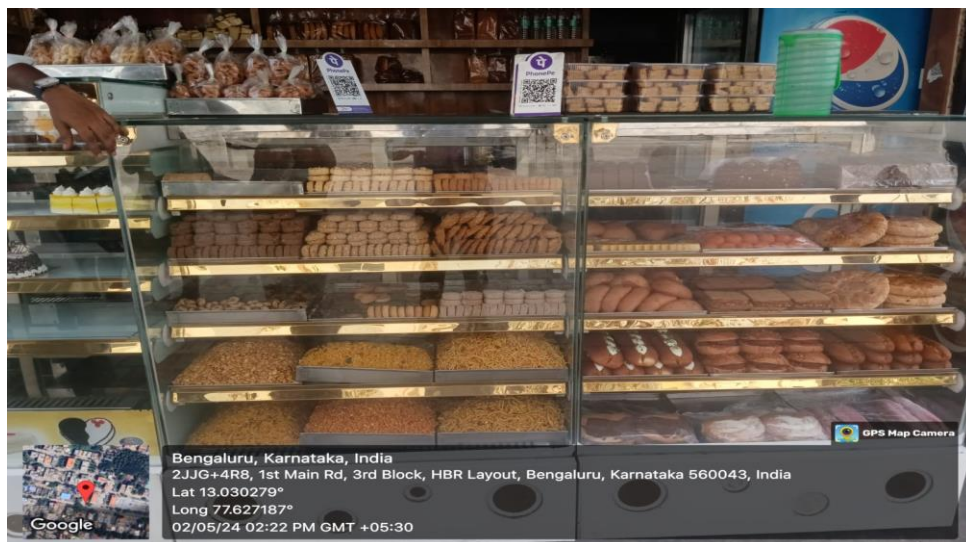


Figure 10 : Investing in sustainable packaging for a greener future

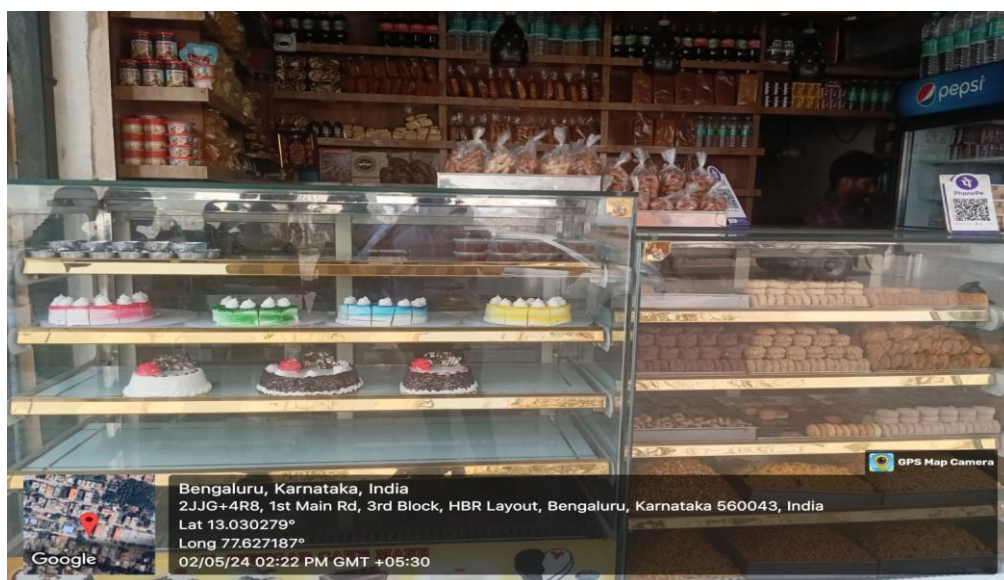


Figure 11 : Reducing food waste, one package at a time



Figure 12 : Investing in sustainable packaging for a greener future

CONCLUSION:

Food preservation and packaging are crucial aspects of our food system, significantly impacting health, economy, and the environment. These practices ensure food safety, extend shelf life, and offer convenience, enhancing our quality of life. As challenges like food waste and environmental sustainability arise, it is vital to adopt innovative preservation methods and sustainable packaging solutions. By embracing these advancements, we enjoy the benefits of preserved food while minimizing our ecological footprint, contributing to a healthier planet and society. Prioritizing food preservation and packaging is essential for addressing issues like food waste and sustainability. Implementing cutting-edge techniques and eco-friendly options improves food safety, extends shelf life, and provides convenience. These practices foster a more sustainable and environmentally conscious society. Navigating ongoing challenges requires focusing on innovative approaches to preservation and packaging. This reduces ecological impact and ensures a healthier future for our planet and future generations. Food preservation and packaging play vital roles in our food system, influencing various aspects of life. Addressing food waste and sustainability issues through innovative methods is paramount. By doing so, we reduce our ecological footprint and contribute to a healthier planet and society, ensuring a better quality of life for all.