FOOD PROCESSING AND PACKAGING TECHNOLOGY & ENTREPRENEURSHIP DEVELOPMENT

PRACTICAL

M.Sc. FOOD AND NUTRITION SCIENCE
SEMESTER-II, PAPER-VI

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M.Sc. FOOD AND NUTRITION SCIENCE: FOOD PROCESSING AND PACKAGING TECHNOLOGY & ENTREPRENEURSHIP DEVELOPMENT (PRACTICAL)

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FOREWORD

Since its establishment in 1976, Acharya Nagarjuna University has been forging ahead in the path of progress and dynamism, offering a variety of courses and research contributions. I am extremely happy that by gaining 'A+' grade from the NAAC in the year 2024, Acharya Nagarjuna University is offering educational opportunities at the UG, PG levels apart from research degrees to students from over 221 affiliated colleges spread over the two districts of Guntur and Prakasam.

The University has also started the Centre for Distance Education in 2003-04 with the aim of taking higher education to the door step of all the sectors of the society. The centre will be a great help to those who cannot join in colleges, those who cannot afford the exorbitant fees as regular students, and even to housewives desirous of pursuing higher studies. Acharya Nagarjuna University has started offering B.Sc., B.A., B.B.A., and B.Com courses at the Degree level and M.A., M.Com., M.Sc., M.B.A., and L.L.M., courses at the PG level from the academic year 2003-2004 onwards.

To facilitate easier understanding by students studying through the distance mode, these self-instruction materials have been prepared by eminent and experienced teachers. The lessons have been drafted with great care and expertise in the stipulated time by these teachers. Constructive ideas and scholarly suggestions are welcome from students and teachers involved respectively. Such ideas will be incorporated for the greater efficacy of this distance mode of education. For clarification of doubts and feedback, weekly classes and contact classes will be arranged at the UG and PG levels respectively.

It is my aim that students getting higher education through the Centre for Distance Education should improve their qualification, have better employment opportunities and in turn be part of country's progress. It is my fond desire that in the years to come, the Centre for Distance Education will go from strength to strength in the form of new courses and by catering to larger number of people. My congratulations to all the Directors, Academic Coordinators, Editors and Lesson-writers of the Centre who have helped in these endeavors.

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M.Sc. FOOD AND NUTRITION SCIENCE

SEMESTER-II, PAPER-VI

PRACTICAL-II

206FN24-FOOD PROCESSING AND PACKAGING TECHNOLOGY & ENTREPRENEURSHIP DEVELOPMENT

SYLLABUS

I

Preparation, Packaging, Storage and Shelf Life Studies of Following Food Products

1) Squashes and Juices From Locally Available Fruits
2) Mixed Fruit Jam, Guava Jelly, Morabba, Marmalade
3) Candied Peels and Jelly Crystals
4) Tomato Ketchup and Green Chilli Sauce
5) Pickles and Chutneys from Mango, Tomato, Lime, Carrots etc.
6) Dehydrated Products from Vegetables
7) Papads from Sago, Rice, Dal
8) Salad Dressings
9) Identification of Different types of Packaging and Packaging Materials

II

Entrepreneurship Development

10) Case Studies of Women Entrepreneurs (2 Sessions)
11) Visits to Enterprises Run by Women Entrepreneurs and Regional Entrepreneurship Support Systems (3 Sessions)
12) Development of Business Plans (4 Sessions)
13) Hands on Experience in Business (2 Sessions)

EXPERIMENT-1.1

SQUASHES AND JUICES FROM LOCALLY AVAILABLE FRUITS

OBJECTIVE

To prepare fruit squashes from locally available fruits and understand the process of preservation using sugar and citric acid.

PRINCIPLE

Fruit squashes are concentrated fruit beverages prepared by extracting fruit juice, adding sugar, water, and permitted preservatives such as sodium benzoate or potassium metabisulfite. The high sugar concentration acts as a preservative by reducing water activity, thus inhibiting microbial growth.

INTRODUCTION

Squashes are popular ready-to-serve beverages made from fruit juice or pulp blended with sugar syrup, acids, and preservatives. They are refreshing, nutritious, and rich in natural vitamins and minerals from fruits. The preparation of squashes provides a way to utilize seasonal fruits effectively, reduce post-harvest losses, and offer a value-added product with longer shelf life. Commonly used fruits include mango, orange, pineapple, guava, and mixed fruits.

INGREDIENTS

1) Fresh, locally available fruits (e.g., mango, orange, pineapple, guava, or mixed fruits)
2) Sugar
3) Citric acid
4) Potassium metabisulfite (KMS) or sodium benzoate (preservative)
5) Water
6) Strainer or muslin cloth
7) Clean sterilized bottles for storage

PROCEDURE:

1) Select ripe, good-quality fruits and wash them thoroughly
2) Peel and cut the fruits into small pieces.
3) Extract juice using a mixer or juice extractor.

4) Strain the juice through a clean muslin cloth.

5) Prepare sugar syrup by dissolving sugar in water and boiling it for a few minutes.

6) Cool the syrup and mix it with the fruit juice in a ratio of 1 part juice to 1.5-2 parts syrup.

7) Add citric acid and preservative (KMS or sodium benzoate) in recommended quantities.

Fig. 1.1: Fruit Squashes

1) Mix well and fill into sterilized bottles, leaving a small headspace.

2) Seal the bottles tightly and store them in a cool, dry place.

3) Label the bottles properly with the name, date, and batch number.

SELF-ASSESSMENT QUESTIONS

1) What is the principle behind preservation of squashes?

2) Why is citric acid added in squash preparation?

3) What are the common preservatives used in fruit squashes?

4) How does sugar concentration affect shelf life?

5) What are the advantages of preparing squashes from locally available fruits?

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1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

2) Manay, N. S., & Shadakshara Swamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.

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EXPERIMENT-1.2

MIXED FRUIT JAM, GUAVA JELLY, MORABBA, MARMALADE

OBJECTIVES:

- To prepare mixed fruit jam using locally available fruits and to understand the preservation process through sugar concentration and acid balance.
- To prepare clear guava jelly and to study the process of gel formation using natural pectin present in guava.
- To prepare fruit morabba and understand the process of preservation through sugar impregnation and osmotic dehydration.
- To prepare orange marmalade and study the process of gel formation from citrus peel and pulp with sugar and acid.

PRINCIPLE

Jam is a semi-solid product obtained by boiling fruit pulp with sugar and acid until it sets to a gel-like consistency. The gelling occurs due to the interaction of pectin, sugar, and acid under heat. The high sugar concentration reduces water activity, thereby preventing microbial spoilage and extending shelf life.

Jelly formation occurs due to the coagulation of pectin in the presence of acid and sugar when heated. Guava is naturally rich in pectin, which reacts with sugar and acid to form a transparent, firm gel. The sugar acts as a preservative by lowering water activity.

Morabba is prepared by cooking fruits in concentrated sugar syrup until they become tender and absorb the syrup. The high sugar concentration preserves the product by reducing water activity and preventing microbial growth.

Marmalade is made from citrus fruits by boiling fruit pulp and peel with sugar and acid until a gel forms. The pectin from citrus peel, along with sugar and acid, forms a jelly-like consistency. The high sugar content acts as a preservative.

INTRODUCTION

Mixed fruit jam is a popular fruit preserve prepared using a combination of fruits such as apple, papaya, pineapple, banana, and guava. It combines flavor, color, and nutrients of different fruits to create a tasty and energy-rich spread. Jam preparation also helps in utilizing surplus fruits effectively and preventing post-harvest losses.

Guava jelly is a clear, sparkling, and firm fruit preserve with an attractive flavor and high vitamin C content. It is prepared from guava extract and is a rich source of natural

antioxidants. The process demonstrates the principle of pectin gelation and the importance of proper proportion of sugar and acid for good texture and clarity.

Morabba is a traditional sweet preserve made from fruits like amla, apple, or mango. It is rich in vitamins and minerals and has a long shelf life. The process involves slow cooking in sugar syrup, allowing fruits to absorb sweetness while maintaining their shape and color.

Marmalade is a type of fruit preserve containing both juice and peel of citrus fruits such as orange or lemon. It has a pleasant bitter-sweet taste and a glossy appearance. The peel adds texture and flavor, making it distinct from jam or jelly. Marmalade preparation demonstrates pectin extraction from citrus peel and the importance of balanced acidity for proper gelation.

1.2 (A) MIXED FRUIT JAM

INGREDIENTS

1) Mixed fruits (apple, pineapple, papaya, banana, guava, etc.)
2) Sugar
3) Citric acid or lemon juice
4) Pectin (if required)
5) Water
6) Sterilized glass jars

PROCEDURE:

1) Wash, peel, and cut the fruits into small pieces.
2) Boil the fruits with a small quantity of water until soft.
3) Mash or blend the fruits into pulp.
4) Add equal weight of sugar to the pulp.
5) Boil the mixture with continuous stirring.
6) Add citric acid or lemon juice during boiling.
7) Test for the end point (sheet or drop test).
8) Pour the hot jam into sterilized jars, seal, label, and store.

Fig. 1.2: Apple Jam

1.2 (B) GUAVA JELLY

INGREDIENTS

1) Ripe guavas
2) Sugar
3) Citric acid or lemon juice
4) Water
5) Sterilized glass jars

PROCEDURE

1) Wash and cut guavas into small pieces.
2) Boil with water until soft.
3) Strain the extract through a muslin cloth without squeezing.
4) Measure the extract and add equal weight of sugar.
5) Boil the mixture with constant stirring until the jelly sets (test by dropping on a plate - should form a wrinkle).
6) Add citric acid during boiling.
7) Pour the hot jelly into sterilized jars, seal, and label.

Fig. 1.3: Guava Jelly

1.2 (C) MORABBA

INGREDIENTS

1) Selected fruit (amla, apple, or mango)
2) Sugar
3) Citric acid
4) Water
5) Clean glass jars

PROCEDURE

1) Wash and prick the fruits.
2) Boil slightly to soften.
3) Prepare sugar syrup by dissolving sugar in water.
4) Add fruits and cook until they become translucent.
5) Add citric acid to prevent crystallization.
6) Cool and fill in sterilized jars, seal, and store.

Fig. 1.4: Amla Morraba

1.2 (D) MARMALADE

INGREDIENTS

1) Oranges or other citrus fruits
2) Sugar
3) Citric acid or lemon juice
4) Water
5) Sterilized glass jars

PROCEDURE

1) Wash and peel the oranges thinly.
2) Cut peel into fine shreds and extract juice.
3) Boil peel in water until soft.
4) Add juice and sugar, then boil until it sets (gel test).
5) Add citric acid to balance acidity.
6) Pour hot marmalade into sterilized jars, seal, and label.

Fig. 1.5: Orange Marmalade

SELF-ASSESSMENT QUESTIONS

1) What gives marmalade its bitter taste?
2) What is the main preservative factor in morabba?
3) What gives jelly its gel texture?
4) What is the principle involved in jam preparation?

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1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
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EXPERIMENT- 1.3

CANDIED PEELS AND JELLY CRYSTALS

OBJECTIVES:

- To prepare candied fruit peels and understand the preservation technique using sugar impregnation.
- To prepare fruit-based jelly crystals and study the gelling mechanism using sugar, pectin, and acid.

PRINCIPLE

Candied peels are prepared by boiling fruit peels in concentrated sugar syrup, allowing sugar to penetrate the peel and act as a preservative by reducing water activity. The osmotic effect of sugar prevents microbial growth and preserves the fruit for extended periods.

Jelly crystals are solidified sugar-based gel cubes made by boiling fruit extract with sugar, pectin, and acid. Pectin forms a three-dimensional network in the presence of sugar and acid, giving a firm, crystalline texture. Sugar acts as a preservative by reducing water activity.

INTRODUCTION:

Candied peels are sweet, translucent fruit peels, commonly prepared from citrus fruits such as orange, lemon, or lime. They are widely used as confectionery, baking ingredients, or decorative garnishes. This process helps in utilizing fruit peels that would otherwise be discarded, adding value while preserving nutrients and flavor.

Jelly crystals are popular confections made from fruit juice, sugar, and pectin. They are visually attractive, chewy, and sweet, commonly consumed as snacks or used in desserts. This preparation demonstrates gel formation, sugar crystallization, and the balance of acidity required for proper texture.

1.3 (A) CANDIED PEELS

INGREDIENTS

1) Citrus peels (orange, lemon, or lime)
2) Sugar
3) Water
4) Citric acid or lemon juice
5) Sterilized containers or trays

PROCEDURE

1) Wash the peels thoroughly and cut into thin strips.
2) Boil peels in water to remove bitterness.
3) Drain water and prepare sugar syrup by dissolving sugar in water.
4) Boil the peels in sugar syrup until translucent and tender.
5) Add citric acid to enhance flavor and prevent crystallization.
6) Remove the peels, drain excess syrup, and dry on trays or store in sterilized containers.

Fig. 6: Orange candied peel

1.3 (B) JELLY CRYSTALS

INGREDIENTS

1) Fruit juice (mango, orange, pineapple, etc.)
2) Sugar
3) Pectin
4) Citric acid or lemon juice
5) Water
6) Moulds or trays

PROCEDURE

1) Extract fruit juice and strain to remove pulp.
2) Prepare sugar syrup and dissolve pectin in it.
3) Boil the juice and sugar-pectin mixture while stirring continuously.
4) Add citric acid to balance acidity.
5) Pour the hot mixture into molds or trays.
6) Allow to cool and set until firm.
7) Cut into cubes and store in airtight containers.

Fig. 7: Jelly crystal

SELF-ASSESSMENT QUESTIONS:

1) What gives jelly crystals their firm texture?

2) Why is pectin essential in jelly crystal preparation?

3) What is the main preservation principle in candied peels?

4) Why are citrus peels preferred for candying?

REFERENCES:

1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.

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EXPERIMENT-1.4

TOMATO KETCHUP AND GREEN CHILLI SAUCE

OBJECTIVE

- To prepare tomato ketchup and understand the preservation process using sugar, salt, and acidity.
- To prepare green chilli sauce and study its preservation using acidity and salt.

PRINCIPLE

Tomato ketchup is prepared by cooking tomato pulp with sugar, salt, and acid until a thick, semi-solid consistency is obtained. The combined effect of high sugar concentration, salt, and acidity preserves the product by reducing water activity and inhibiting microbial growth.

Green chilli sauce is made by grinding green chillies and cooking them with vinegar, salt, and sugar. The acidic environment, along with salt and sugar, reduces water activity, preventing microbial growth and extending shelf life.

INTRODUCTION

Tomato ketchup is a popular condiment made from ripe tomatoes, sugar, salt, and spices. It has a tangy-sweet flavor and is widely used with fast foods and snacks. The preparation demonstrates principles of concentration, acidification, and preservation, while allowing efficient utilization of tomatoes.

Green chilli sauce is a spicy, tangy condiment prepared from fresh green chillies. It is widely used to enhance flavor in snacks, fast foods, and meals. This preparation demonstrates the principles of acidification, spice extraction, and preservation while maintaining color, flavor, and pungency of chillies

1.4 (A) TOMATO KETCHUP

INGREDIENTS

1) Ripe tomatoes
2) Sugar
3) Salt
4) Vinegar or citric acid
5) Spices (optional - clove, cinnamon, pepper)
6) Water
7) Sterilized bottles or jars

PROCEDURE

1) Wash and chop tomatoes.
2) Boil tomatoes with a little water until soft.
3) Mash and strain to remove seeds and skin.
4) Add sugar, salt, vinegar, and spices to the pulp.
5) Boil the mixture until thickened to ketchup consistency.
6) Cool and pour into sterilized bottles, seal, label, and store.

Fig. 8: Tomato ketchup

1.4 (B) GREEN CHILLI SAUCE

INGREDIENTS

1) Fresh green chillies
2) Vinegar
3) Salt
4) Sugar
5) Water
6) Garlic (optional)
7) Sterilized bottles

PROCEDURE

1) Wash and chop green chillies.
2) Grind chillies with a little water to form a paste.
3) Boil the paste with vinegar, salt, and sugar until slightly thickened.
4) Add garlic if desired for flavor.
5) Cool and pour into sterilized bottles, seal, label, and store.

Fig. 9: Green Chilli Sauce

SELF-ASSESSMENT QUESTIONS:

1) How is green chilli sauce preserved?
2) What is the role of salt in the sauce?

3) How can the color and pungency be maintained?

4) How does sugar help in preservation?

5) Name any two optional spices used in ketchup.

6) What is the final consistency expected for ketchup?

REFERENCE BOOKS:

1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.

2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.

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EXPERIMENT-1.5

PICKLES AND CHUTNEYS FROM MANGO, TOMATO, LIME, CARROTS

OBJECTIVES:

- To prepare raw mango pickle and understand preservation using salt, oil, and spices.
- To prepare tomato pickle and study the preservation process through salt, spices, and oil.
- To prepare lime pickle and understand the role of acidity and salt in preservation.
- To prepare carrot pickle and study preservation using salt, vinegar, and spices.

PRINCIPLES:

Preservation occurs due to salt and oil, which create a barrier to microbial growth, while spices contribute flavor and antimicrobial properties. Tomatoes are preserved using salt, oil, and spices, which inhibit microbial growth and enhance shelf life. Limes are preserved by salt and acidity; high salt concentration and natural acids prevent spoilage. Carrots are preserved in salt, vinegar, and spices; the acidic environment and osmotic effect of salt reduce water activity, preventing microbial growth.

INTRODUCTION:

Pickles are traditional preserved foods made from fruits or vegetables with salt, oil, spices, and sometimes acid. They are flavorful, nutrient-rich, and extend the shelf life of seasonal produce. Mango, tomato, lime, and carrot pickles are widely consumed and demonstrate different preservation methods including oil-based, salt-based, and acid-based techniques.

1.5 (A) MANGO PICKLE

INGREDIENTS

1) Raw mangoes – 1 kg
2) Salt – 100 g
3) Red chili powder – 50 g
4) Mustard seeds – 20 g
5) Fenugreek seeds – 10 g
6) Turmeric powder – 5 g
7) Oil – 200 ml

PROCEDURE:

1) Wash, peel (optional), and cut mangoes into small pieces.
2) Dry mango pieces in sunlight for 1-2 hours.
3) Mix mango pieces with salt, turmeric, red chili powder, and powdered mustard seeds.
4) Heat oil and cool slightly, then mix with mango and spice mixture.
5) Store in sterilized glass jars and keep in sunlight for 3–5 days for maturation.

Fig. 10: Mango Pickle

1.5 (B) TOMATO PICKLE

INGREDIENTS:

1) Ripe tomatoes – 1 kg
2) Salt – 50 g
3) Red chili powder – 30 g
4) Mustard seeds – 10 g
5) Fenugreek seeds – 5 g
6) Turmeric powder – 5 g
7) Oil – 150 ml

PROCEDURE:

1) Wash tomatoes and cut into small pieces.
2) Mix tomatoes with salt, turmeric, red chili powder, and powdered mustard seeds.
3) Heat oil and cool slightly, then mix with tomato mixture.
4) Pack in sterilized glass jars and store in sunlight for 3–5 days.

Fig. 11: Tomato Pickle

1.5 (C) LIME PICKLE

INGREDIENTS

1) Limes – 500 g
2) Salt – 50 g
3) Red chili powder – 25 g
4) Turmeric powder – 5 g
5) Mustard seeds – 10 g
6) Oil – 100 ml

PROCEDURE:

1) Wash and cut limes into small pieces.
2) Mix limes with salt, turmeric, and red chili powder.
3) Heat oil and add powdered mustard seeds. Cool slightly.
4) Mix oil and spice mixture with limes and pack into sterilized jars.
5) Keep in sunlight for 10–15 days for ripening.

Fig. 12: Lemon pickle

1.5 (D) CARROT PICKLE

INGREDIENTS

1) Carrots – 500 g
2) Salt – 25 g
3) Vinegar – 100 ml
4) Red chili powder – 15 g
5) Mustard seeds – 5 g
6) Oil – 50 ml

PROCEDURE

1) Wash, peel, and cut carrots into thin sticks.
2) Blanch carrot sticks in boiling water for 2–3 minutes.
3) Mix carrots with salt, red chili powder, and mustard seeds.
4) Boil vinegar with oil and cool slightly.
5) Mix vinegar-oil solution with carrot mixture and store in sterilized jars.

SELF-ASSESSMENT QUESTIONS

1) What is the main principle of preservation in mango pickles?
2) How does salt preserve tomato and lime pickles?
3) Why oil is used in mango and tomato pickles?
4) What role does vinegar play in carrot pickle?
5) Mention two spices that act as antimicrobial agents in pickles.
6) How does sunlight help in the maturation of mango and lime pickles?
7) What differences exist between oil-based and acid-based pickles?

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1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
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EXPERIMENT-1.6

DEHYDRATED PRODUCTS FROM VEGETABLES

OBJECTIVE

To prepare dehydrated vegetable products and study the methods of preservation by removing moisture to increase shelf life.

PRINCIPLE:

Dehydration involves the removal of water from vegetables through heat or air circulation, reducing water activity and inhibiting microbial growth. The process preserves nutrients, color, flavor, and texture while allowing long-term storage without refrigeration.

INTRODUCTION:

Dehydrated vegetables are dried products obtained from fresh vegetables such as carrots, beans, peas, spinach, or cabbage. Dehydration is a widely used preservation technique that reduces post-harvest losses and allows seasonal vegetables to be available throughout the year. Various methods like sun drying, hot air oven drying, and tray drying are employed to achieve uniform moisture removal. Dehydrated vegetables are used in soups, ready-to-cook mixes, and convenience foods.

INGREDIENTS:

1) Fresh vegetables (carrot, beans, peas, spinach, cabbage, etc.)
2) Salt (optional, for blanching)
3) Water (for washing and blanching)
4) Tray, hot air oven, or dehydrator

PROCEDURE:

1) Wash vegetables thoroughly to remove dirt and debris.
2) Cut vegetables into uniform sizes for even drying.
3) Blanch vegetables in boiling water for 2–5 minutes depending on type, then cool in cold water.
4) Drain excess water and spread vegetables evenly on trays.
5) Dry vegetables in a hot air oven at 50–60°C or use a dehydrator until moisture content is reduced to 10–12%.
6) Cool dehydrated vegetables to room temperature.
7) Pack in airtight containers or vacuum-sealed pouches and store in a cool, dry place.

Fig. 13: Dehydrated Products

SELF-ASSESSMENT QUESTIONS

1) What is the main principle behind vegetable dehydration?
2) Why is blanching important before drying vegetables?
3) Name three vegetables commonly dehydrated.
4) How does dehydration prevent microbial growth?
5) List two advantages of dehydrated vegetable products.

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1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
3) Potter, N. N., & Hotchkiss, J. H. (2018). Food Science. Springer

EXPERIMENT-1.7

PAPADS FROM SAGO, RICE AND DAL

OBJECTIVE:

To prepare papads from sago, rice, and lentils (dal) and study the methods of preparation, shaping, and drying for preservation.

PRINCIPLE:

Papads are thin, crisp sheets made from starchy or legume-based dough. The dough is flavored with spices and salt, rolled thin, and dehydrated through sun drying or mechanical drying. Removal of moisture prevents microbial growth and allows long-term storage.

INTRODUCTION:

Papads are traditional Indian crispy snacks made from sago (tapioca), rice, or pulses such as urad dal and moong dal. They are seasoned with salt, spices, and sometimes asafoetida, then rolled into thin sheets and dried. Papads serve as accompaniments to meals and snacks. This process demonstrates starch gelatinization, dough handling, and dehydration principles to produce shelf-stable products.

1.7 (A) SAGO PAPAD

INGREDIENTS:

1) Sago (tapioca pearls) - 250 g
2) Salt - 5 g
3) Water - as required
4) Optional spices - black pepper, chili powder

PROCEDURE:

1) Soak sago in water for 2-3 hours until soft.
2) Grind soaked sago to a smooth paste.
3) Mix salt and optional spices into the paste.
4) Spread the dough into thin circular sheets using a rolling pin or papad press.
5) Dry sheets in sunlight or a dehydrator until crisp.
6) Store in airtight containers.

Fig. 14: Sago Papad

1.7 (B) RICE PAPAD

INGREDIENTS:

1) Rice flour - 250 g
2) Salt - 5 g
3) Water - as required
4) Optional spices - cumin seeds, chili powder

PROCEDURE

1) Mix rice flour with water to form a stiff dough.
2) Add salt and optional spices.
3) Divide dough into small portions and roll into thin circular sheets.
4) Dry the rolled sheets in sunlight or a mechanical dryer until crisp.
5) Store in airtight containers.

Fig. 15: RICE PAPAD

1.7 (C) DAL PAPAD

INGREDIENTS:

1) Urad dal or moong dal - 250 g
2) Salt – 5 g
3) Water - as required
4) Optional spices - black pepper, chili powder, asafoetida

PROCEDURE

1) Soak dal for 4–6 hours.
2) Grind soaked dal into a smooth paste.
3) Mix salt and optional spices into the paste.
4) Spread dough into thin circular sheets using a rolling pin or papad press.
5) Sun dry or dehydrate until crisp.
6) Store in airtight containers.

Fig. 16: Dal Papads

SELF-ASSESSMENT QUESTIONS

1) What is the main preservation principle in papads?
2) Why is it important to roll the dough thin?
3) How does dehydration prevent microbial growth?
4) Name three types of papads commonly prepared.
5) What role do spices play in papad preparation?

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1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
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EXPERIMENT-8

SALAD DRESSING

OBJECTIVE

- To prepare mayonnaise salad dressing and understand the process of emulsification and flavor balance in an oil-in-water emulsion.

PRINCIPLE

Mayonnaise is an oil-in-water emulsion where egg yolk acts as an emulsifying agent, stabilizing the mixture of oil and acidic components like vinegar or lemon juice. Proper emulsification prevents separation and ensures smooth, creamy texture. Salt, mustard, and other seasonings enhance flavor, while acidity provides mild preservation.

INTRODUCTION

Mayonnaise is a widely used salad dressing and condiment made from oil, egg yolk, vinegar or lemon juice, and seasonings. It demonstrates the principle of emulsification blending immiscible liquids into a stable mixture. Mayonnaise can be used in salads, sandwiches, and spreads. Correct technique ensures a thick, creamy, and stable product.

INGREDIENTS

1) Egg yolk – 1
2) Vinegar or lemon juice – 15 ml
3) Mustard paste – 2 g
4) Salt – 2 g
5) Oil (vegetable/olive) – 50 ml

PROCEDURE

1) Place egg yolk in a clean bowl and whisk with vinegar/lemon juice, mustard, and salt.
2) Slowly add oil drop by drop while continuously whisking to form a smooth emulsion.
3) Once the mixture thickens, oil can be added in a thin steady stream while whisking
4) Adjust seasoning as needed.
5) Store in a clean container in the refrigerator and use within a few days.

Fig. 17: Red Chilli Spicy and Mint Mayonnaise

SELF-ASSESSMENT QUESTIONS:

1) What is emulsification and why is it important in mayonnaise?
2) Which ingredient acts as the emulsifier in mayonnaise?
3) How does vinegar or lemon juice contribute to the product?
4) Why should oil be added slowly while whisking?
5) Name two uses of mayonnaise salad dressing.

REFERENCES:

1) Ranganna, S. (2019). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
3) Potter, N. N., & Hotchkiss, J. H. (2018). Food Science. Springer.

EXPERIMENT-1.9

IDENTIFICATION OF DIFFERENT TYPES OF PACKAGING AND PACKAGING MATERIALS

OBJECTIVE

- To identify and classify different types of food packaging and packaging materials, and to understand their properties, uses, and suitability for various food products.

PRINCIPLE

Food packaging provides protection, preservation, and information about the product. Different materials have distinct physical, chemical, and barrier properties that determine their suitability for specific food types. Understanding these properties helps in selecting appropriate packaging to maintain quality, extend shelf life, and ensure safety.

INTRODUCTION

Packaging is a critical component of the food industry, serving functions such as protection from physical, chemical, and microbial damage, convenience in handling, and marketing. Common packaging materials include plastics, glass, metals, paper, and biodegradable materials. Proper identification of packaging types helps students understand the compatibility of packaging with different foods and the role of packaging in preservation, transportation, and consumer acceptance.

TYPES OF PACKAGING

1) Primary Packaging – Direct contact with food (e.g., bottles, cans, wrappers).
2) Secondary Packaging – Provides additional protection or grouping (e.g., cartons, boxes).
3) Tertiary Packaging – Used for bulk handling and transport (e.g., pallets, shrink wraps).

PACKAGING MATERIALS AND IDENTIFICATION

1) Plastics – Flexible (films, pouches) or rigid (bottles, trays); lightweight, moisture-resistant.
2) Glass – Transparent, non-reactive; used for juices, jams, pickles.
3) Metals – Cans, aluminum foil; excellent barrier against moisture, light, and oxygen.

4) Paper and Paperboard – Cartons, boxes; lightweight, printable, biodegradable.
5) Biodegradable/Edible Films – Made from starch, cellulose, or proteins; eco-friendly alternatives.
6) Composite Materials – Laminates combining different materials (e.g., Tetra Pak).

PROCEDURE

1) Collect samples of various food products with different packaging types.
2) Observe and classify each sample as primary, secondary, or tertiary packaging.
3) Identify the material used (plastic, glass, metal, paper, composite, or biodegradable).
4) Note the physical characteristics: transparency, rigidity, barrier properties.
5) Record the suitability of the packaging for the type of food it contains.
6) Discuss the advantages and disadvantages of each material.

SELF-ASSESSMENT QUESTIONS

1) Differentiate between primary, secondary, and tertiary packaging.
2) List two examples of flexible and rigid plastic packaging.
3) Why is glass preferred for acidic foods like pickles?
4) Name one advantage and disadvantage of metal packaging.
5) What are biodegradable packaging materials and their benefits?
6) How does packaging contribute to food safety and shelf life?

REFERENCES

1) Robertson, G. L. (2016). Food Packaging: Principles and Practice. CRC Press.
2) Manay, N. S., & Shadaksharaswamy, M. (2017). Foods: Facts and Principles. New Age International Publishers.
3) Potter, N. N., & Hotchkiss, J. H. (2018). Food Science. Springer.

EXPERIMENT-2.1

WOMEN ENTREPRENEUR

OBJECTIVES

To analyze the role, challenges, and success factors of women entrepreneurs in contributing to economic growth.

INTRODUCTION

Women entrepreneurship has gained specific attention in recent years with an increasing of women starting their own business worldwide. Despite facing various challenges, women entrepreneurs have demonstrated remarkable resilience and success.

Women entrepreneurs now have been recognized as an important economic source for both family and country. Women entrepreneurs have been recognized during the last decade as an important source of economic growth. They create new jobs for themselves and others.

There may be several success factors including their passions and determination strong support system, adaptable business model and quality product's. They may face several challenges including marketing financing and balance their business.

CASE STUDY-I (WOMEN ENTREPRENEUR)

1) **Business Type:** Organic cooking oil
2) **Name of Entrepreneur:** D. Lakshmi Devi
3) **Name of Enterprise:** Bhanu wooden cold pressed oils
4) **Age:** 35 years
5) **Year of Establishment:** 2022 (3 years)
6) **Turn over:** 15 Lakhs per annum
7) **No of employees:** No employees
8) **Employee wages:** -
9) **Each product discription:** coconut oil, groundnut oik, sesame oil, vegetable powders.
10) Each product development: Kanuru
11) **If any Branches:** no
12) **Selling Media:** offline and online
13) **Present Location**: Yadavulla bazar, opp medical store, prasadampadu, 521108, Vijayawada
14) **Monthly profit:** 80K

CONCLUSION

Bhanu Wooden Cold Pressed Oils, established by D. Lakshmi Devi in 2022, has emerged as a successful small-scale organic oil business in Vijayawada. By producing and selling high-quality cold-pressed coconut, groundnut, and sesame oils along with natural vegetable powders, the enterprise has built a strong market presence both offline and online. Despite having no employees, the entrepreneur has effectively managed operations, achieving a notable annual turnover and consistent monthly profit. This case highlights the potential of women-led organic businesses in contributing to sustainable entrepreneurship and local economic development.

SELF ASSESSMENT QUESTIONS

1) What are the main organic products offered by Bhanu Wooden Cold Pressed Oils?
2) How has the entrepreneur managed to sustain and grow her business without employees?

3) What are the key success factors that have contributed to the monthly profit of ₹80,000?

4) How does the selling media (offline and online) impact the reach and growth of the enterprise?

REFERENCE

1) Vasanth Desai, the Dynamic of Entrepreneurial Development and Management, Himalaya Publishing House.

EXPERIMENT-2.2

VISIT TO ENTERPRISES RUN BY WOMEN ENTREPRENEURS AND REGIONAL ENTREPRENEURSHIP SUPPORT SYSTEM

WOMEN ENTREPRENEUR

Business type: Clothing

Name of Entrepreneur: R. Jyothirmayi

Name of Enterprise: Dedeepya Jyothi's Boutique

Age: 32 years

Year of Establishment: 2020 (5 years)

Turnover: 12 lakhs per annum

No. of Employees: 12 employees

Employee wages: seniors-20k, juniors- 10k

Each product description: Designer wears, sarees, blouse, dresses, Kurtis, fancy wear

Each product development: Chirala

If any branches: No

Present Location: shop no – 3 Janitha plaza, Rajula Bazar, Ramavarappadu, 521108, Vijayawada

Monthly Profits: 1 Lakhs

CONCLUSION:

Dedeepya Jyothi’s Boutique, established by R. Jyothirmayi in 2020, has grown into a successful clothing business specializing in designer wear, sarees, blouses, dresses, Kurtis, and fancy wear. With a team of 12 skilled employees, the boutique has built a strong reputation for quality and creativity, achieving an annual turnover of ₹12 lakhs and a steady monthly profit of ₹1 lakh. By focusing on fashionable, well-crafted garments sourced from Chirala and catering to diverse customer preferences, the enterprise has effectively tapped into the growing demand for ethnic and designer clothing. The business reflects strong entrepreneurial skills, strategic workforce management, and consistent customer engagement, making it a sustainable and profitable venture.

SELF ASSESSMENT QUESTIONS:

1) What are the key products offered by *Dedeepya Jyothi's Boutique*, and how do they appeal to the target market?
2) How has the entrepreneur structured her workforce to support the production and sales process?
3) What factors have contributed to the boutique's steady profit and market growth over the past five years?
4) How does sourcing products from Chirala enhance the uniqueness and quality of the boutique's offerings?
5) What lessons can aspire entrepreneurs learn from this case study regarding team management and product diversification?

REFRENCE:

1) Uddin Entrepreneurship development in India Sami University Press.

EXPERIMENT-2.3

DEVELOPMENT OF BUSINESS PLAN
MILK'S MAGIC

OBJECTIVES:

- To provide fresh milk and high-quality dairy products to meet the needs of households, restaurants and local vendors.

INTRODUCTION ABOUT THE PRODUCT

The business focuses on supplying fresh buffalo and cow milk and preparing high demand dairy products like curd, butter, ghee, paneer, cheese and lassi. The products cater to households, restaurants and local vendors.

KEY FEATURES AND BENEFITS

- High demand and Daily use products.
- Nutritious and fresh milk from buffalo and cow.
- Value added products increase profitability
- Low capital and high ROI potential.
- Support local employment and farmers.

AREA

Approx 150-200 sqft

NO. OF WORKERS

2 Members:

1 for delivery

1 for processing and packaging

CAPITAL FUNDING

2 Lakhs

FUNDING RESOURCES

Personal funds Family Investment

PRODUCTS PRODUCED BY MILK MAGIC:

- Milk and Milk products
- Buffalo milk, cow milk, colostrum milk Curd
- Butter
- Ghee
- Paneer
- Cheese
- Lassi

M.R.P OF MILK PRODUCTS

- Cow milk – 1 liter – 120/-
- Colostrum milk – 1 liter – 200/

MILK PRODUCTS:

- Curd – 250gms – 50/-
- Butter – 250gms – 100/-
- Ghee – 250gms – 250/-
- Paneer – 200gms – 95/-
- Cheese – 200gms – 140/-
- Lassi – 1 glass – 30/-

EQUIPMENT REQUIRED:

- Milk cans, steel vessels
- Weighing scale
- Deep freeze and refrigerator
- Cream separator
- Mixer/ blender
- Packaging material (cups, cover, containers)

OVERALL EXPENDITURE:

- Raw milk purchase – 1, 44,000 (buffalo) + cow milk as needed

- Transport – 6,000
- Labor – 20,000
- Electricity – 1000
- Equipment – 15,000
- Total – 1, 86,000

PROFIT:

Assuming – 80 litre buffalo milk a day at 90/- / litre = 2, 16,000/month

Plus, sale of value-added products like (curd, ghee, paneer) = 60,000 – 80,000/ month Estimated total monthly revenue = 2, 70,000 – 2, 90,000

Monthly profit after expense's = 80,000 – 1,00,000

Annual profit: 9.6 - 12 lakhs

Profit per month is – 80,000 – 1, 00,000

RISK FACTORS:

- Milk spoilage due to improper storage
- Seasonal variation in milk supply and price
- Competition from branded dairy products
- Dependency on raw milk availability
- Hygiene and FSSAI compliance risks

CONCLUSION:

The Milk's Magic business plan demonstrates a strong potential for profitability and sustainable growth through the supply of fresh buffalo and cow milk along with high-demand value-added dairy products. With a modest investment, the business can cater effectively to households, restaurants, and local vendors, ensuring both quality and affordability. By focusing on freshness, nutritional value, and daily consumer needs, *Milk's Magic* can generate a stable monthly profit of

₹80,000–₹1,00,000, making it a promising small-scale dairy enterprise. However, careful attention to storage, hygiene, compliance, and market competition will be essential to ensure consistent operations and long-term success**.**

SELF ASSESSMENT QUESTIONS

1) What are the key objectives and unique features that make *Milk's Magic* a viable business idea?
2) How does the business plan address production, processing, and delivery with limited manpower?
3) What are the major sources of expenditure, and how do they impact the profit margin?
4) What risks could affect the business, and how might they be mitigated to ensure sustainability?
5) How do value-added products contribute to the profitability of the enterprise compared to raw milk sales?

REFERENCE:

1) Food Safety and Standards Authority of India (FSSAI). (2022). Regulations for Milk and Milk Products

EXPERIMENT-2.4

HANDS ON EXPERIENCE IN BUSINESS

OBJECTIVES:

- To gain practical experience in running a business
- To understand how to manage moneh, customers, products
- To improve communication, leadership, and problem-solving skills
- To learn how to start and grow a business in the real world

INTRODUCTION:

Hands on experience in business offer valuable insights into real-time decision-making teamwork, and entrepreneurship. In our initiative, both men, women actively participated in various roles such as planning, production, marketing, sales and customer engagement. This inclusive environment collaboration leadership development, across business functions, enables participants to gain practical exposure and problem-solving skills essential for running or supporting business.

Overall, the experiences help to build confidence, leaderships and entrepreneurial thinking among all types of the skills and experiences in the business and also different quality ibn different way which improves an approach towards entrepreneurial sector.

CASE STUDY – I

Business type: Homemade traditional pickles and masalas

Name of the entrepreneur: K. Anitha

Name of the enterprise: Anitha homemade spices and pickles

Age: 40 years

Years of establishment: 2021

Turn over: 20lakhs per annum

No. of employees: 2 part time helpers

Employee wages: 6,000 per month per helpers

Each product description: Mango pickle, lemon pickles, Gongora pickle, garam masala, sambar powder, rasam powder

Each product development: All products are developed at her home kitchen in prasadhampadu, Vijayawada using traditional methods, sun drying and stone ground spices.

If any Branches: No branches

Selling Media: Local markets, whatsapp orders, online and offline and local grocery partnership

Present Location: Ballem Vari Veedhi, Prasadampadu, Vijayawada-521108.

Monthly profit: 1, 00,000-22, 00,000 (1-2 lakhs)

CONCLIUSION:

This hands-on business experience helped us learn how to work as a team manage task and understand hour a business run which include different stages from the product manufactory to the acceptance purchase to the customers which built trust among Retailers and consumer women took part in effective manner.

SELF ASSESSMENT QUESTIONS:

1) What are the main products offered by *Anitha Homemade Spices and Pickles*, and how are they traditionally prepared?
2) How has the entrepreneur utilized local resources and traditional methods to establish her business?
3) What marketing and selling strategies are used to reach customers both online and offline?
4) How do part-time helpers contribute to the business operations, and what does this indicate about the enterprise's scale?
5) How does this case study reflect the importance of practical entrepreneurial experiences in building leadership and business skills?

REFERENCE:

1) Uddin Entrepreneurship Development in India Sami University Press.