

# Handbook on Fruits, Vegetables & Food Processing with Canning & Preservation (3rd Edition)

**Author:** NPCS Board

**Format:** Paperback

**ISBN:** 9788178330839

**Code:** NI19

**Pages:** 688

**Price:** Rs. 1,475.00 **US\$** 150.00

**Publisher:** Asia Pacific Business Press Inc.

Usually ships within **5** days

Natural foods such as fruits and vegetables are among the most important foods of mankind as they are not only nutritive but are also indispensable for the maintenance of the health. India is the second largest producer of fruits and vegetables in the world. Fertile soils, a dry climate, clean water and abundant sunlight help the hard working farmers to produce a bountiful harvest. Although there are many similarities between fruits and vegetables, there is one important difference that affects the way that these two types of crop are processed like fruits are more acidic than vegetables. Food processing is the set of methods and techniques used to transform raw ingredients into food or to transform food into other forms for consumption. Food processing typically takes clean, harvested crops or butchered animal products and uses these to produce attractive, marketable and often long shelf-life food products. Canning is a method of preserving food in which the food is processed and sealed in an airtight container. Food preservation is the process of treating and handling food to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by micro organisms. One of the oldest methods of food preservation is by drying, which reduces water activity sufficiently to prevent or delay bacterial growth. Drying also reduces weight, making food more portable. Freezing is also one of the most commonly used processes commercially and domestically for preserving a very wide range of food including prepared food stuffs which would not have required freezing in their unprepared state. Fruits and vegetable processing in India is almost equally divided between the organized and unorganized sector, with the organized sector holding 48% of the share. The present book covers the processing techniques of various types of fruits, vegetables and other food products. This book also contains photographs of equipments and machineries used in fruits, vegetables and food processing along with canning and preservation. This book is an invaluable resource for new entrepreneurs, food technologists, industrialists etc.

## Contents

### 1. Characteristics of the Food Industry

Components of the Food Industry

Allied Industries

Interrelated Operations

### 2. Food Quality Assurance

The Need

A Role for Government

Microbiological Standards  
A Role for Industry  
Design of Company QA Program  
Objectives  
Raw Material Quality Assurance  
In-process Quality Assurance  
Finished Product Quality Assurance

### 3. Quality Factors in Foods

Appearance Factors  
Color and Gloss  
Consistency  
Textural Factors  
Measuring Texture  
Texture Changes  
Flavor Factors  
Additional Quality Factors  
Quality Standards  
Planned Quality Control

### 4. Preserve, Candied and Crystallized Fruits and Vegetables

Preserve  
General considerations  
Candied Fruits/Vegetables  
Process  
Glazed Fruits/Vegetables  
Crystallized Fruits/Vegetables  
Problems in Preparation of Preserves and Candied Fruits

### 5. Food Preservation by Fermentation

Life with Microorganisms  
Fermentation of Carbohydrates  
Industrially Important Organisms in Food Preservation  
Order of Fermentation  
Types of Fermentations of Sugar  
Fermentation Controls  
Wine  
Preservation  
Sterilization Filtration  
Beer  
Vinegar Fermentation  
Principles of Vinegar Fermentation  
Vinegar Making  
Preparation of Yeast Starter  
Alcoholic Fermentation  
Acetic Fermentation  
Cheese  
Kinds of Cheese  
Cottage Cheese  
Swiss Cheese  
Blue Cheeses

### 6. Chemical Preservation of Foods

What Are Food Additives?

- Importance of Chemical Additives
- Legitimate Uses in Food Processing
- Undesirable Uses of Additives
- Safety of a Food Additives
- Functional Chemical Additive Applications
- Specific Uses of Chemical Additives
- Additives Permitted and Prohibited in the United States
- Chemical Preservatives
  - Microbial Antagonists
  - Sorbic Acid
  - Antibiotics
- Quality Improving Agents
- Other Chemical Additives
  - Artificial Flavoring
  - Artificial Coloring

## 7. Cold Preservation and Processing

- Distinction Between Refrigeration and Freezing
- Refrigeration and Cool Storage
- Requirements of Refrigerated Storage
  - Controlled low Temperature
  - Air Circulation and Humidity
  - Modification of Gas Atmospheres
- Changes in Food During Refrigerated Storage
- Freezing and Frozen Storage
  - Initial Freezing Point
  - Freezing Curve
  - Changes During Freezing
  - Choice of Final Temperature
- Food Composition
- Noncompositional Influences
- Freezing Methods
  - Air Freezing
- Packaging Considerations
- Some Additional Developments

## 8. Heat Preservation and Processing

- Sterilization
- Commercially Sterile
- Pasteurization
- Blanching
- Selecting Heat Treatments
- Heat Resistance of Microorganisms
- Thermal Death Curves
- Margin of Safety
- Heat Transfer
  - Conduction and Convection Heating
- Cold Point in Food Masses
- Determining Process Time and Process Lethality
- Protective Effects of Food Constituents
- Different Temperature-Time Combinations
- Heating Before or After Packaging

## 9. Food Pickling and Curing

Pickled Fruits and Vegetables

Use of Salt Stock

Sour Pickles, Sweet Pickles, Processed Dill Pickles

Sauerkraut

Olives

Fermented And Pickled Products

Deterioration

Nutritional Value

Bloater Damage Control

Controlled Fermentations in Commercial Brining Tanks

Brine Recovery

Defect Reduction

The Principles of Fish Salting

The Influence of the Composition of Salt

Commercial Methods of Salting Fish

Brine-salting

Dry-salting

Comparative Efficiency of Brine-salting and Dry-salting

Some-curing Processes

Cold-smoking (Heavy Salt Cure)

Smoked Salmon

Hard-smoked Salmon

Meat Curing and Smoking

Pickled Meats

Salt

Sugar and Corn Syrup Solids

Nitrite and/or Nitrate

Nitrosamines

Phosphates

Sodium Erythorbate

Cured Meat Color

Role of Nitrite and/or Nitrate in Meat Color

Sausages and Table-ready Meats

Dry Sausage Manufacture

Processing

Fermentation

## 10. Food Preservation by Drying

Drying-A Natural Process

Dehydration-Artificial Drying

Dehydration vs. Sun Drying

Why Dried Foods?

Dehydration Permits Food Preservation

Humidity-Water Vapor Content of Air

RH-The drying Medium

Types of Driers

Adiabatic Driers

Heat Transfer through a Solid Surface

Criteria of Success in Dehydrated Foods

Freeze-Dehydration (Freeze Drying)

Triple Point of Water

Temperature Changes in Meat Freeze-dehydration

Influence of Dehydration on Nutritive Value of Food

Dehydration of Fruits

Dehydration of Vegetables

Dehydration of Animal Products

Dehydration of Fish

Dehydration of Milk

Dehydration of Eggs

Packaging of Dehydrated Foods

11. Food Preservation by Canning 1

Temperature vs. Pressure

Heat Resistance of Microorganisms Important in Canning

Factors Influencing the Heat Resistance of Spores

Heat Resistance of Enzymes in Food

Heat Penetration into Food Containers and Content

Storage of Canned Foods

External Corrosion of Cans

Coding the Pack

Influence of Canning on the Quality of Food

Color

Flavour and Texture

Protein

Improvements in Canning Technology

Retort Pouches

Testing a Good Seal

Hazard Analysis

12. Pickles

Preservation with Salt

Preservation with Vinegar

Preservation with Oil

Preservation with Mixture of Salt, Oil, Spices and Vinegar

Problems in pickle making

13. Chutneys and Sauces/Ketchups

Chutneys

Recipes for chutneys

Sweet mango chutney

Apple chutney

Plum chutney

Wood apple chutney

Apricot chutney

Papaya chutney

Tomato chutney

Aonla chutney

Sauces (Ketchups)

Recipes for sauces (ketchups)

Tomato sauce

Apple sauce

Plum sauce

Papaya sauce

Mushroom sauce

Aonla sauce

Problem in the preparation of sauces/ketchups

#### 14. Mushroom Processing

Dehydration

Preparation of ketchup

Preservation with salt and acetic acid

Pickling

Canning

Mushroom poisoning

#### 15. Tomato Processing

#### 16. Jam, Jelly and Marmalade

Jam

Problems in jam production

Jelly

Important considerations in jelly making

Pectin

Acid

Sugar

Judging of end-point

Marmalade

After pectin extraction

#### 17. Freezing of Fruits and Vegetables

Preparation of fruits/vegetables for freezing

Methods of freezing

Sharp freezing (Slow freezing)

Quick freezing

By direct immersion

Advantages

Disadvantages

By indirect contact with refrigerant

By air blast

Cryogenic freezing

Dhydro-freezing

Freeze-drying

Changes during freezing and storage for frozen products

Freezing process for fruits and vegetables

#### 18. Vinegar

Types of vinegar

Steps involved in vinegar production

Outline Scheme of Vinegar Production

Preparation of vinegar

Slow process

Orleans slow process

Quick process (Generator or German process)

Precautions

Problems in vinegar production

#### 19. Drying and Dehydration of Fruits and Vegetables

Advantages of dehydration over sun-drying

Spoilage of dried products  
Reconstitution test for dried/dehydrated products  
Reconstitution test

## 20. The Canning Process

Cans  
Types of Cans  
Square and Pullman Base  
Pear Shaped  
Round Sanitary  
Drawn Aluminum  
Oblong  
Can Materials  
Retorts  
Nonagitating Retorts  
Continuous Agitating Retorts  
Hydrostatic Retorts  
Establishment of Retort Schedule  
Pasteurized Canned Products  
Closing  
Pasteurizing Cook  
Cooling  
Storage and Shelf Life  
Aseptic Canning

## 21. Food Freezing

Development of a Frozen Food Industry  
The Freezing Point of Foods  
Percentage Water Frozen vs. Temperature of Food and  
Its Quality  
Size of Ice Crystals Formed  
Volume Changes During Freezing  
Refrigeration Requirements in Freezing Foods  
Freezing in Air  
Freezing by Indirect Contact with Refrigerants  
Direct Immersion Freezing  
Packaging Requirements for Frozen Foods  
Influence of Freezing on Microorganisms  
Influence of Freezing on Proteins  
Influence of Freezing on Enzymes  
Influence of Freezing on Fats  
Influence of Freezing on Vitamins  
Freezing of Bakery Products  
Packaging  
Storage Life of Frozen Bread  
Cookies and Cakes  
Frozen Dairy Foods  
The Ice Cream Industry  
Basic Ingredients  
Manufacture of Ice Cream  
The Mix  
Pasteurization  
Homogenization

Cooling  
Freezing  
Hardening  
Hazard Analysis  
Hazard Categories

## 22. Cookie and Cracker Production Technology

Ingredients Handling  
Mixing  
Dough Relaxation and Fermentation  
Dough Machining and Forming  
Dough Relaxing  
Cutting Stage  
Scrap Return  
Salter or Sugar Sprinkling  
Rotary Molding  
Extruder-Dough Formers  
Wire Cut  
Rout Press  
The Fruit Bar Coextruder  
Baking  
Direct-Fired Ovens, Gas Fired  
Convection (Indirect) Ovens  
Post Conditioning  
Secondary Processes  
Icings  
Enrobing  
Sandwiched Cookies and Crackers  
Biscuit Packaging

## 23. Snack Foods

Introduction  
Popcorn  
Four Types of Popcorn  
Mechanism of Popping  
Quality factors  
Processing  
Formulated Puffed Snacks  
Ingredients  
Other Grain Products  
Expandable Ingredients  
Frying Fats  
Antioxidants  
Sweeteners  
Other Ingredients  
Extruders and Extruding  
Types of Extruders  
Snacks that Are Cooked and Formed  
Drying

## 24. Breakfast Cereals

Introduction  
Present Status



Processing of Hot-serve Cereals  
Wheat Cereals  
Corn Cereals  
Oat Cereals  
Processing Ready-to-Eat Breakfast Cereals  
Flakes  
General Considerations  
Corn Flakes  
Wheat flakes  
Bran Flakes  
Shreds  
Shredded Wheat Biscuits  
Puffed Cereals  
General Considerations  
Oven-puffed Rice  
Puffing by Extrusion  
Sugar-coated Products  
Ovens

## 25. Canned Meat Formulations

Corned Beef Hash  
Federal Meat Inspection Regulations  
Preparation  
Meat  
Potatoes  
Onions  
Canning  
Beef Stew  
Federal Meat Inspection Regulations  
Preparation  
Meat  
Potatoes  
Carrots  
Onions  
Preparation  
Canning  
Chili Con Carne  
Federal Meat Inspection Regulations  
Preparation  
Canning  
Vienna Sausages  
Federal Meat Inspection Regulations  
Preparation  
Canning  
Meat Balls with Gravy  
Federal Meat Inspection Regulations  
Preparation  
Canning  
Sliced Dried Beef  
Federal Meat Inspection Regulations  
Preparation  
Drying and Smoking  
Canning

Luncheon Meat  
Federal Meat Inspection Regulations  
Preparation  
Canning  
Processing  
Sterile  
Pasteurized  
Potted Meat  
Federal Meat Inspection Regulations  
Preparation  
Canning  
Canned Hams-Pasteurized and Sterile  
Federal Meat Inspection Regulations  
Preparation  
Smoking  
Canning  
Filling and Pressing  
Closing  
Processing  
Pasteurized  
Sterile  
Plastic Packaged Hams  
Preparation  
Packaging  
Processing

## 26. Cured or Smoked Meats

Hams  
Classification of Ham  
Internal Temperature  
Added Substance  
Presence of Bone  
Commercial Ham Manufacture  
Curing  
Smoking/Cooking  
Cooked Ham  
Baked Ham  
Preparation  
Country Ham  
Preparation  
Westphalian Ham  
Preparation  
Scotch Ham  
Prosciutti Ham  
Preparation  
Honey Cured Hams  
Preparation  
Bacon  
Canadian Bacon  
Wiltshire Bacon  
Beef Bacon  
Jowl Bacon  
Fat Backs and Heavy Bellies

Smoked Pork Loin  
Picnic  
Shoulder Butt  
Corned Beef  
Smoked Fresh Meat  
Dried Beef  
Procedure  
Smoked and Cured Lamb  
Smoked Tongue  
Pickled Pigs Feet

## 27. Sausage Formulations

### Ground Sausages

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

### Semidry or Summer Sausages

Instructions

Instructions

Instructions

Instructions

### Dry Sausages

Instructions

Instructions

Instructions

### Emulsion-Type Sausages

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

### Liver Sausage and Braunschweiger

Instructions

Instructions

Instructions

### Speciality Items

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

Instructions

### Mortadella Linguica (Portuguese Sausage)

Instructions  
Instructions

## 28. Processing of Rice

Introduction

Quality of Rice

Milling of Rice

Small-scale Milling

Modern Conventional Milling

Abrasive Milling of Rice

Lye-peeling

Extractive Milling

Rice Flour

Further Processing of Rice

Boiling and Steaming

Parboiling

Quick-cooking Rice

Shelf-stable Cooked Rice

Rice Cakes

Rice Milk

## 29. Creaming, Emulsions, and Emulsifiers

Emulsifier and Emulsions

Classification

Hydrophilic-Lipophilic Balance (HLB)

Oil-in-Water Emulsions

Type of Emulsifier used in Cookies and Crackers

Phosphatides and Lecithin

Synthetic Emulsifiers

Function of Emulsifiers in Cookies and Crackers

Eggs

Emulsifier

Mixing Operation in Cookie and Cracker Doughs

Mixing Operation

Creaming Method

Two-stage Method

Three-stage Method

Baking Cookies and Crackers

Emulsion Stability

Viscosity

To Lower Viscosity

To Increase Viscosity

Elevated Temperature

Inversion Phase

Phase Equilibria

Batter Aeration

## 30. Principles of Food Packaging

Introduction

Functions of Food Packaging

Requirements For Effective Food Packaging

Types of Containers

Primary, Secondary, and Tertiary

Form-Fill-Seal Packaging  
Hermetic Closure  
Food-Packaging Materials and Forms  
Metal  
Metal Cans  
Can Construction  
Can Corrosion  
Can Sizing  
Glass  
Glass Containers  
Paper, Paperboard, and Fiberboard  
Plastics  
Laminates  
Retortable Pouches and Trays  
Edible Films  
Wood and Cloth Materials  
Package Testing  
High Barrier Plastic Bottles  
Aseptic Packaging in Composite Cartons  
Military Food Packaging

Directory Section  
Suppliers of the Plant and Machinery  
Addresses of Packaging Machinery  
Suppliers of Raw Material Suppliers

Machinery & Equipments (Photographs)

## About NIIR

**NIIR PROJECT CONSULTANCY SERVICES (NPCS)** is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

---

**NIIR PROJECT CONSULTANCY SERVICES** , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** [npcs.india@gmail.com](mailto:npcs.india@gmail.com) **Website:** [NIIR.org](http://NIIR.org)

