

Handbook on Food Biotechnology (Extraction, Processing of Fruits, Vegetables and Food Products) 2nd Revised Edition

Author: NIIR Board of Consultants & Engineers

Format: Paperback

ISBN: 9789381039816

Code: NI153

Pages: 400

Price: Rs. 1,495.00 **US\$** 39.95

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Usually ships within **5** days

Modern biotechnology refers to various scientific techniques used to produce specific desired traits in plants, animals or microorganisms through the use of genetic knowledge. Since its introduction to agriculture and food production in the early-1990, biotechnology has been utilized to develop new tools for improving productivity. Biotechnology is a broad term that applies to the use of living organisms and covers techniques that range from simple to sophisticated.

In contrast, modern agricultural biotechnology techniques, such as genetic engineering, allow for more precise development of crop and livestock varieties. The potential benefits of biotechnology are enormous. Food producers can use new biotechnology to produce new products with desirable characteristics. These include characteristics such as disease and drought-resistant plants, leaner meat and enhanced flavor and nutritional quality of foods. This technology has also been used to develop life-saving vaccines, insulin, cancer treatment and other pharmaceuticals to improve quality of life.

It is estimated that in the next 20-30 years demand for food will increase by 70%. Biotechnology will be key to meeting this demand. This handbook is designed for use by everyone engaged in the food technology such as fermentation, developing and testing of food and students who are pursuing their career in food biotechnology. It provides all information on modern cooking, food processing and preservation methods, juice preparation methods, etc.

The major content of the book are Fermenter and Bio-Reactor Design, Development and Testing of a Milled Shea Nut Mixer, Production of Pure Apple Juice in Natural Colour, Drying of Ginger using Solar Cabinet Dryer, Roasting of Coffee Beans, Processing of Guava into Pulp Guava Leather, Processing and Preservation of Jack Fruit, Quality Changes in Banana, Processing and Quality Evaluation of Banana Natural Colour, Large Scale Separation and Isolation of Proteins, Preparation and Storage Studies on Onion-Ginger-Garlic Paste, Bitterness Development in Kinnow Juice, Effect of Incorporation of Defatted Soyflour, Gum from Ber Fruits, Juice Extraction of Aonla (*Emblica Officinalis Gaertn.*) Cv. 'Chakaiya', Defatted Mucuna Flour in Biscuits, Detoxifying Enzymes, Processing Methods and Photographs of Machinery with Suppliers Contact Details.

This book will be a mile stone for its readers who are new to this sector, will also find useful for professionals, entrepreneurs, those studying and researching in this important area.

Contents

1. FERMENTER AND BIO-REACTOR DESIGN

NOTATION

FERMENTATION PROCESSES

BIOLOGICAL CONSTRAINTS

Nutrient

Oxygen

Temperature

pH

Rheology

Other Constraints

PRODUCT TYPE

Intracellular Products

Extracellular Product

Secondary Metabolites

FERMENTER CATEGORIES

Overview

Batch/Continuous Fermenters

Batch Operation

Continuous Operation

Agitated Fermenters

Stirred Fermenter

Air-agitated Fermenter

Internal Circulation

Air-lift Fermenter

Immobilised Systems

ANAEROBIC FERMENTATIONS

Novel Fermenters

DESIGN PROCEDURES

Scale-up

Kinetics

(vi)

OXYGEN TRANSFER

Oxygen Demand

Basis of Scale-up

Heat Transfer

SAFETY

STERILE DESIGN AND CONTAINMENT

Principles

Techniques

Pre-sterilisation

Feed Sterilisation

Sterile Barriers

FUTURE TRENDS

2. DEVELOPMENT AND TESTING OF A MILLED SHEA NUT MIXER

MATERIALS AND METHODS

Design of the Mixer

Developmental

Geometry of mixing bowl

Mixing velocity of beater

Beater Mounting Shaft

CONSTRUCTION OF THE MIXER

Frame

Mixing Beater Shaft

Mixing Vessel

Evaluation

RESULTS AND DISCUSSION

Effect of Beater Speed on Mixing Period, capacity and Oil Recovery

Economics of the Mixer

CONCLUSION

NOTATIONS

3. PRODUCTION OF PURE APPLE JUICE IN NATURAL COLOUR

MATERIALS AND METHODS

Apple

Juicer

Modification of Juicer

Hot Water Bath

Cold Water bath

Filtration

Bottling and Sterilization

(vii)

Spectrum of Brown Pigment formed in Apple Juice and

Measurement of Degree of Browning

Determination of the Temperature required for Inactivation of PPO

Sensory Evaluation

Operational Procedure

Cleaning of Tube in Water Baths

Apple Powder

RESULTS AND DISCUSSION

Organoleptic Evaluation

4. DRYING OF GINGER USING SOLAR CABINET DRYER

5. ROASTING OF COFFEE BEANS

ROASTING PROCESS

Physical Properties

Swelling Ratio

Breaking Strength

Colour Value

Organoleptic Evaluation

6. PROCESSING OF GUAVA INTO PULP AND GUAVA LEATHER

EXTRACTION OF PULP

Preparation of Guava Leather

Preparation of Ready-to-Serve Drinks

Chemical Constituents

Pulp Analysis

Quality of Guava Leather

CONCLUSION

7. PROCESSING AND PRESERVATION OF JACK FRUIT

8. QUALITY CHANGES IN BANANA

BANANAS

Fermentation

Analysis

Sensory Evaluation

Statistical Analysis

Total Soluble Solids (°Brix)

Total Titratable Acidity

Colour

Clarity

(viii)

Sensory Evaluation

Microbiological Evaluation

DEVELOPMENT OF PROCESSING TECHNOLOGY AND QUALITY

EVALUATION OF PAPAYA (CARICA PAPAYA) CHEESE ON STORAGE

MATERIALS AND METHODS

Raw Materials

Processing

Experimental Design

Physical and Microbiological Analyses

Sensory Evaluation

RESULTS AND DISCUSSION

Colour and Texture

Sensory Qualities

Microbiological Properties

9. PROCESSING AND QUALITY EVALUATION OF BANANA

BANANAS

Processing

Physico-Chemical Analysis

Microbial Analysis

Sensory Analysis

Sensory Evaluation

Analyses

Microbial

Storage

10. LARGE SCALE SEPARATION AND ISOLATION OF PROTEINS

THE NATURE OF PROTEINS

Chemistry

Behaviour in Solution

RECOVERY PROCESS CONCEPTS

SEPARATION TECHNIQUES

Precipitation

Cell Disruption

Solid-Liquid Separations

Usage

Centrifugation

Dead-end Filtration

Cross-flow Filtration

Two-phase Aqueous Liquid-Liquid Extraction

Ultrafiltration and Reverse Osmosis

(ix)

Chromatography

Introduction

Ion Exchange Chromatography

Gel Filtration

Adsorption Chromatography

Hydrophobic Interaction Chromatography

High-performance Liquid Chromatography (HPLC)

Affinity Chromatography

Protein Separations in Electrical Fields

Electrodialysis

Electrophoresis

Isoelectric Focussing

Novel and Experimental Protein Separation Techniques

PROTEIN RECOVERY PROCESSES: NON-FERMENTATION

FEEDSTOCKS

Recovery of Waste Proteins from the Meat Industry

Proteins from Milk

Casein

Whey Powder

Whey Protein Isolate

Proteins from Agricultural Crops

Soya Proteins

'Leaf ' Proteins

Vegetable Processing Waste Streams

Protein Recovery from Blood Plasma

Human Blood

Animal Blood

RECOVERY OF MICROBIAL AND ANIMAL CELL PROTEINS

Recovery Process Principles

Single-cell Protein

Extracellular Enzyme Recovery Processes

Recovery of Biologically Active Proteins

Impact of rDNA Techniques on Protein Recovery

SAFETY ASPECTS OF PROTEIN RECOVERY PROCESSES

11. PREPARATION AND STORAGE STUDIES ON ONION-GINGER-GARLIC PASTE

PREPARATION OF PUREE

Preparation of mixed paste

Colour measurement

Storage studies

Physico-chemical properties

Statistical analysis

Storage characteristics

(x)

STUDIES ON DEVELOPMENT OF INSTANT CHUTNEYS FROM PUDINA (MINT, MENTHA SPICATA) AND GONGURA (HIBISCUS SP)

Materials

Preparation of fresh chutneys

Preparation of instant chutneys

Chemical analysis

Reconstitution of instant chutney powders at room temperature

12. BITTERNESS DEVELOPMENT IN KINNOW JUICE

MATERIALS AND METHODS

Materials

Juice

Ready-to-Serve (RTS) beverage

Squash

Lye peeling of segments

Jam

Candy

Physico-chemical analysis

Sensory analysis

Statistical analysis

RESULTS AND DISCUSSION

Kinnow juice

Kinnow RTS beverage

Kinnow squash

Standardisation of lye peeling

Kinnow jam

Kinnow candy

13. EFFECT OF INCORPORATION OF DEFATTED SOYFLOUR

RAW MATERIAL

Preparation of sweet biscuits

Proximate composition

Textural analysis

Sensory evaluation

14. GUM FROM BER FRUITS

15. JUICE EXTRACTION OF AONLA (EMBLICA OFFICINALIS GAERTN.) CV. 'CHAKAIYA'

ANALYSIS

Physico-chemical characteristics

Organoleptic evaluation

(xi)

16. DEFATTED MUCUNA FLOUR IN BISCUITS

BISCUIT FORMULATION

Chemical analysis

17. DETOXIFYING ENZYMES

GOITROGENIC GLYCOSIDES

CYANOGENIC GLYCOSIDES

Cassava

Lima Beans

Fruit and Nut Kernels

FLATULENCE-PRODUCING OLIGOSACCHARIDES PHYTATE

Effect of Autolysis

Effect of Adding Phytase

Effect of Germination

Effect of Fermentation

OTHER ANTI-NUTRITIONAL FACTORS

Protease Inhibitors and Lectins

Toxic Glucosides

Gossypol

Lathrogenic Factor

CONCLUSIONS

18. PROCESSING METHODS

SUGAR REFINING

The Sugar Cane

The Sugar Beet Roots

THE PURPOSE OF THE REFINING PROCESS

The Raw Sugar

The Refined White Sugar

Cube Sugar

STAGES IN THE REFINING PROCESS

The First Process—Mixing With Raw Syrup

The Syrup and Washings Are Now Boiled to Grain

Removing the Coarse Insoluble Impurities

Removal of Further Impurities

The Bone Charcoal Treatment for Decolorisation

The Wet Char is Next Removed to the Revivification Kilns

The Revivification Kilns

How Refined Sugar is Obtained from the Fine Liquor

The Formation of the Sugar Crystals

The Rotating Dryers

Treatment to Produce Further Yields of Sugar

Packing the Sugars

(xii)

SUGAR CONFECTIONERY

HIGH BOILINGS

Starch Syrup

Methods of Cooking

Cooling and Manipulation

FONDANT

FONDANT CREAMS

Deposition into Moulds

Wet Crystallization

JELLIES AND GUMS

Soft Jellies

Hard Gums

TOFFEE, CARAMEL, AND FUDGE

Fudge

NOUGAT AND MARSHMALLOW

LOZENGES

CHOCOLATE MANUFACTURE

RAW MATERIALS

Cocoa

Sugar

Cocoa Butter

Milk

Flavours

Commercial Lecithin

PROCESSING

Roasting

Breaking and Winnowing

Grinding

Melangeuring

Refining

Conching

CHOCOLATE FLUIDITY

Methods of Control

Factors Affecting Fluidity

MOULDING AND COVERING

Tempering

Cooling Tunnels

STORAGE PROPERTIES

Insect Infestation

JAM MANUFACTURE

SCIENTIFIC PRINCIPLES

FRUIT AND ITS PREPARATION

(xiii)

Strawberries

Raspberries

Blackcurrants

Gooseberries

Plums

Apples

Citrus Fruits

PRESERVATION OF FRUIT

Sulphurous Acid as a Preservative

Preparation of Cooked Fruit Pulp

JAM BOILING

Basic Rules

The Boiling Process

FINISHING AND STORING

Filling Containers By Hand

Filling Machines

Sealing Methods

EDIBLE FATS—SHORTENINGS

MANUFACTURE OF LARD

Dry Rendering

Wet Rendering

Qualities of Lard

LARD COMPOUNDS

HYDROGENATED OILS

Preliminary Refining

Hydrogenation

Deodorisation

Vitamin Addition

Cooling

COMPOUND SHORTENINGS

STABILITY OF SHORTENINGS

FLOUR MILLING

THE STRUCTURE OF THE WHEAT GRAIN

THE MILLING PROCESS

Wheat Intake

Wheat Cleaning

Washing and Conditioning

The Break System

Break Scalping

Purification

Reduction System

Pneumatic Conveying

Flour Treatment and Flour Bleaching

(xiv)

COMPOSITION OF WHEAT AND ITS MILLED PRODUCTS

BAKING QUALITY OF WHEAT FLOUR

Protein Quality

Diastatic Activity

WHEAT BLENDING

WHEAT TESTING

BREADMAKING

INGREDIENTS OF BREAD

Proportions of Materials Used

PREPARATION OF THE DOUGH

Fermentation of the Dough

What is there in a Dough ?

What Happens in the Dough during Fermentation?

The Factors Affecting Gluten Maturing

“Knocking” or “Cutting-back” the Dough

After-Fermentation Treatment

Dividing the Dough into Loaves

The “Hander-up”

The “Moulder”

THE BAKING PROCESS

The Action of the Oven

Yeast Activity Increases as the Temperature Rises

Why Steam is Injected into the Oven

The Death Point of the Yeast

Faults Due to Incorrect Fermentation

Why Loaves are a Pleasant Brown Colour

BREAD WRAPPING

BISCUIT MANUFACTURE AND CAKE MAKING

BISCUITS

INGREDIENTS

Flour

Fats

Other Ingredients

THE BAKING PROCESS

FAULTS

Checking of Biscuits

Bacteriology

CAKES

INGREDIENTS

Flour

Fat

Sweetening Agents

Eggs

Aerating Agents and pH

(xv)

THE MIXING PROCESS

THE BAKING PROCESS

Staling

Bacteriology

19. PHOTOGRAPHS OF PLANT & MACHINERY WITH SUPPLIER'S CONTACT DETAILS

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.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to

venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

NIIR PROJECT CONSULTANCY SERVICES , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** npcs.india@gmail.com **Website:** NIIR.org

Mon, 07 Oct 2024 04:13:48 +0530