

Handbook on Small & Medium Scale Industries (Biotechnology Products)

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The Indian biotechnology industry is one of the fastest growing knowledge-based sectors in India and is expected to play an important role in small & medium enterprises industries. Biotechnology is not just one technology, but many. There are a wide variety of products that the biotechnology field has produced. Biotechnology as well all know, is the field of combination of various fields such as genetics, environmental biology, biochemistry, environmental, general, agriculture, fermentation, etc.

Biotechnology has a long history of use in food production and processing. It has helped to increase crop productivity by introducing such qualities as disease resistance and increased drought tolerance to the crops. Biotechnology used in processing of wines, beers, Coffee, Tea, Cabbage and Cucumber, etc. Fermentation is biotechnology in which desirable microorganisms are used in the production of value-added products of commercial importance. The products of fermentation are many: alcohol and carbon dioxide are obtained from yeast fermentation of various sugars. Lactic acid, acetic acid and Organic acid are products of bacteria action; citric acid, D-Gluconic acid, Coffee, Tea, Cabbage & Cucumber and Yeasts are some of the products obtained from fermentation.

The worldwide demand for biotech products is the only indication; the speed of its advance is the only set to accelerate. Indian Biotechnology industry is considered as one of the sunrise sectors in India. The industry is divided into five major segments: Bio-Pharma, Bio-Services, Bio-Agri, Bio-Industrial and Bio-Informatics. Biotechnology industry's growth in India is primarily driven by vaccines and recombinant therapeutics.

The biotechnology sector of India is highly innovative and is on a strong growth trajectory. The sector, with its immense growth potential, will continue to play a significant role as an innovative manufacturing hub. The high demand for different biotech products has also opened up scope for the foreign companies to set up base in India. Today in India there are more than 350 Biotechnology companies in India providing employment for over 20,000 scientists.

The authors cover different aspects of biotechnology such as production of fermented foods, functional foods, enzymes in food processing. The Book contains production of Wines and Beers, Production of Amino Acids, Lactic Acid, Acetic Acid and Organic Acid, Processing of Coffee, Tea, Cabbage, Cucumber, Yeasts and Photographs of Plant & Machinery with Supplier's Contact Details.

The book provides a better understanding about biotechnology production of value-added products, improve productivity, and enhance product quality in the agro food processing sector. The book is highly recommended to new entrepreneurs, professionals, existing units who wants to start manufacturing business of biotechnology products.

1. WINE

INTRODUCTION

YEASTS AND THE ALCOHOLIC FERMENTATION

A. Yeasts

1. Taxonomy, ecology
2. Industrially important yeasts
3. Killer (K) Yeasts
4. Effect of yeasts on the organoleptic character of wines.

B. YEAST NUTRIENTS IN GRAPE MUSTS

1. Composition of grape musts

Nutritional requirements of yeast and their provision in musts

C. GROWTH OF YEASTS AND ALCOHOLIC FERMENTATION

1. Growth cycle of yeasts and kinetics of the fermentation
2. Fermentation problems and their causes
3. Stimulation of the fermentation
4. Concept of the survival factor

D. BIOCHEMISTRY OF THE FERMENTATION OF GRAPE MUST

1. Primary and secondary products
2. Volatile substances contributing to the aroma of wine

LACTIC ACID BACTERIA AND THE MALO-LACTIC FERMENTATION

A. Lactic Acid Bacteria of Wines

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3. The role of lactic acid bacteria in vinification

B. BACTERIAL GROWTH AND MALO-LACTIC FERMENTATION

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2. Parameters affecting the development of lactic acid bacteria in wines
3. Stimulation of bacterial growth and of the malo-lactic fermentation

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A. Spoilage by Lactic Acid Bacteria

B. SPOILAGE BY ACETIC ACID BACTERIA

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3. Effect of the metabolism of acetic acid bacteria on the quality of musts and wine

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2. Greece and Rome

3. European tribes

4. Africa

5. China

6. India

7. South America

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D. Sanitary Considerations

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B. Beer-Like Beverages

C. Beer Production in the world

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A. Water

B. Alcohol

C. Carbohydrates

D. Nitrogen Compounds

E. Inorganic Constituents

F. Organic Acids

G. Carbon Dioxide

H. Other Compounds

MATERIALS USED IN BREWING

A. WATER

1. Water sources

2. Water purity

3. Water minerals

4. Heavy metals

B. BARLEY AND MALT

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(b) Weathering

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(b) The malting process today

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Kilning

C. Brewing Adjuncts

D. Hops

1. Earliest use of hops

2. The Hop Family

3. Hop Utilization

4. Hop Chemistry

E. Brewer's Yeast

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- 2. Cell morphology and Physiology
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- Glycolyses
- The Pasteur and Crabtree Effect
- (b) Metabolism of Nitrogenous Compounds
- (c) Lipid synthesis
- (d) Sterol Synthesis
- (e) Sulfur Compounds
- (f) Miscellaneous Metabolic Reactions

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- 1. Milling
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 - (b) Wet Milling
 - (c) Adjunct Milling
- 2. Mashing
 - (a) Infusion Mashing
 - (b) Decoction Mashing
 - (c) Malt Conversion
 - (d) Adjunct Conversion
 - (e) Enzyme Activity During Mashing
- 3. Lautering
 - (a) The Lauter Tub
 - (b) Run Off
 - (c) Sparging
 - (d) Wort Filtration
 - (e) Spent Grain Removal
- 4. Wort Boiling
 - (a) Heating
 - (b) Function of Wort Boiling
 - (c) Hop Extraction and Conversion
- 5. Wort Cooling/Trub Removal
 - (a) Hot Trub
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- (a) General Practices
- (b) Microbiological Precautions

B. WORT CONSTITUENTS

- 1. Carbohydrates
- 2. Nitrogenous Compounds
- 3. Inorganic Constituents
- 4. Vitamins
- 5. Polyphenols
- 6. Hop Compounds
- 7. Melanoidins and Phenolic Pigments
- 8. Lipids

C. CELLAR OPERATIONS

- 1. Cold Wort Aeration
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 - (a) Yeast Examination
 - (b) Yeast Population Count

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- (b) Reuse of Yeast
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- (d) Continuous Fermentations
- (e) CO₂ Recovery

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- (a) Washing and Preparation

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- (a) Culture Propagation
- (b) Laboratory Checks

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- (a) Flavor Maturation
- (b) Carbonation
- (c) Standardization
- (d) Chillproofing and Stabilizing
- (e) Clarification

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A. Bacterial Contaminants

1. Gram Positive Bacteria

- (a) Lactobacillus
 - (b) Pediococcus
 - (c) Miscellaneous Cocci
- ##### 2. Gram Negative Bacteria
- (a) Acetic Acid Bacteria
 - (b) Zymomonas
 - (c) Enterobacteriaceae
 - (d) Miscellaneous Wort Organisms

B. WILD YEAST CONTAMINANTS

- 1. Beer Spoiling Yeasts
- 2. Yeast Spoilage Flavors
- 3. Killer Yeasts
- 4. Wild Yeast Control Measures

C. BREWERY PREVENTIVE MEASURES

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A. Bottling Operations

- 1. Filling
- 2. Pasteurization
- 3. Light Struck Beer

B. CANNED BEER

- 1. Can Filling
- 2. Pasteurization
- 3. Shelf Life of Packaged Beer

- (a) Oxygen
- (b) Temperature

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- 1. Cooperage
- 2. Racking

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2. Raw Materials Acceptability
3. Biological Survey of Beer "in process"
4. Analysis of the Finished Beer

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C. Tastable Beer Defects

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3. High Air Beer
4. Light Struck Beer
5. Old, Oxidized Beer
6. Medicinal Odors
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- A. Production of Amino Acids by Wild Strains
- B. Production of Amino Acids by Auxotrophic Mutants
- C. Production of Amino Acids by Regulatory Mutants
- D. Production of Amino Acids from Biosynthetic Precursors

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2. 2-Amino-D2-thiazoline-4-carboxylate hydrolase
3. Hydantoinase

B. Ammonia Lyases

1. Aspartase
2. Phenylalanine Ammonia Lyase

C. Arginine Deiminase

D. Pyridoxal 5'-Phosphate Enzymes

1. Asparate b-decarboxylase
2. b-Tyrosinase

N

3. Tryptophanase
4. Cysteine Desulhydrase
5. Tryptophan Synthase
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B. Enzymatic Methods

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C. Are Microbial Enzymes Involved in Coffee Fermentation?

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B. Types of Tea

C. Physical and Chemical Characteristics of Tea Leaves

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OOLONG AND POUCHONG TEA MANUFACTURE

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- 9. ORGANIC ACID OF MINOR IMPORTANCE

INTRODUCTION

Itaconic Acid

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PROPIONIC AND BUTYRIC ACIDS

TARTARIC ACID

2-OXOGLUTARIC ACID

FUMARIC ACID

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13. PHOTOGRAPHS OF PLANT & MACHINERY

WITH SUPPLIER'S CONTACT DETAILS

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