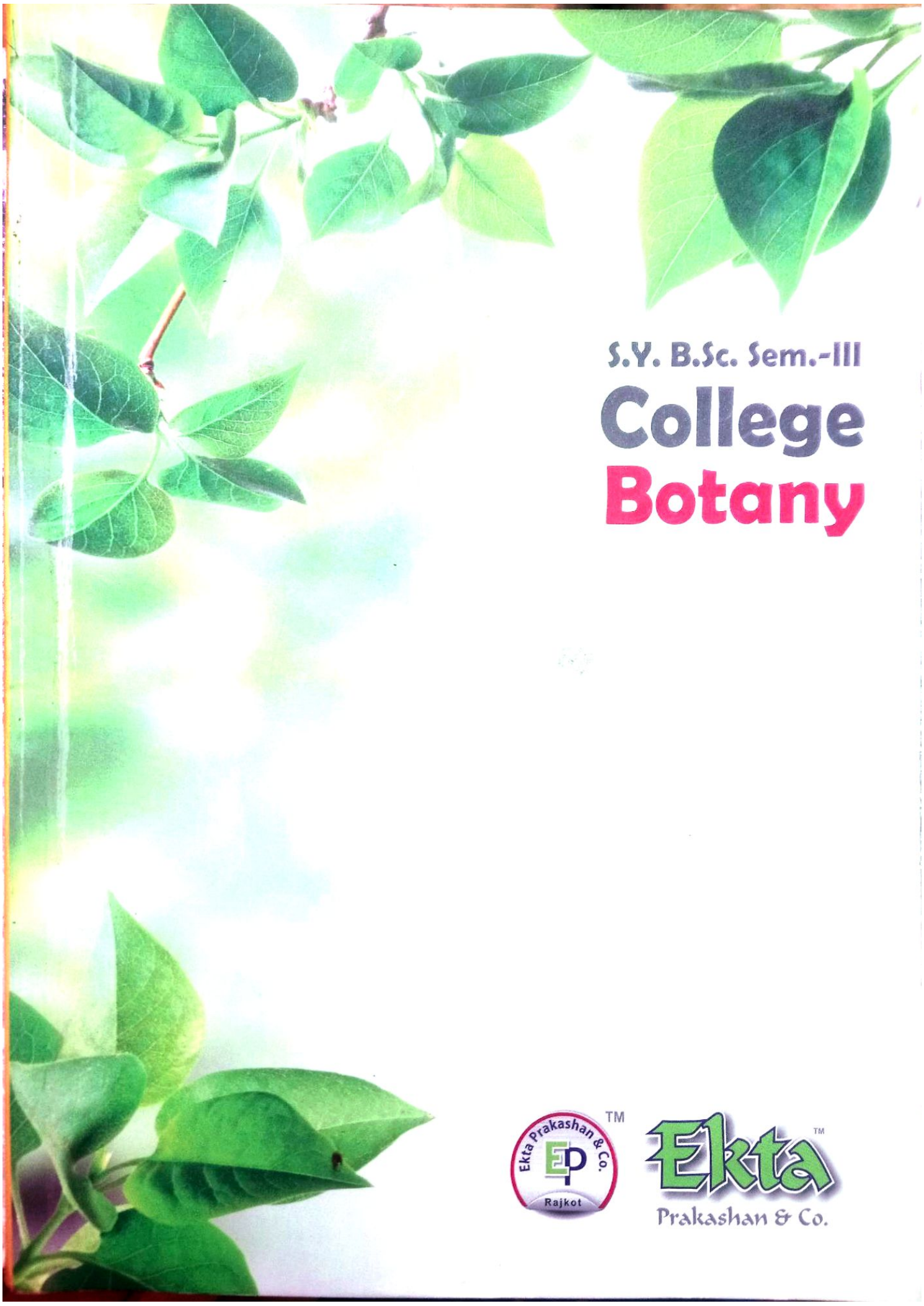

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College Botany

Ekta Prakashan & Co. Rajkot

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COLLEGE BOTANY WITH PRACTICAL

PLANT DIVERSITY-II

(B.Sc. Semester - III)

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Preface

The book of **PLANT DIVERSITY-II (SEM–III)** is the outcome of sincere and combined efforts of the authors. Their main motive remained to provide relevant contents explaining various topics of syllabus in easy language.

The authors has tried to present the subject-matter in an easy understandable way without sacrificing the essential details and general principles and yet avoiding redundant matter and unnecessary complications. The book, as it stands, is expected to meet adequately the needs of the students for whom it is meant. Some of the salient features of the present book are as follows:

This book incorporates study material from various standard reference materials of relevant topic.

This book includes variety of questions, like one mark questions, short questions, Essay type questions.

Suggestions and criticisms for the improvement of this book will be gratefully acknowledged and included in the future edition. Authors are thankful to **Dr. Manish M. Jani** (Chairman, Associate Professor & Head, Bahauddin Science College), **Dr. Mehul Rupani** (other than Dean), **Dr. Girish Bhimani** (Dean), **Dr. Jayesh Parmar** (Ayurvedic Hospital, Rajkot). We are highly obliged to the principal of Christ College - **Dr. Yvonne Fernandes**, Principal of H. & H. B. Kotak Institute of Science – **Dr. Ranjna Agarwal**, the principal of M. P. Shah Arts and Science college, Surendrangar – **Dr. K. D. Parikh.**

We are thankful to Mrs. L. R. Kakkad, the publisher for Ekta Prakashan & Co. to give us this opportunity and rendering all constant support in bringing out this publication. We are also thankful to the typesetting staff and the printers, without their help such a nice publication would not be possible.

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INDEX

UNIT 2.

Fungi

Chapter-6. ULTRA STRUCTURE OF FUNGAL CELL

Ultrastructural studies of fungal cells reveal that fungal cells are eukaryotic cells containing cell wall, cell membrane, true nuclei, nuclear membrane mitochondria, vacuoles, reticulate endothelium, ribosomes etc. like other eukaryotic cells.

The fungal cell wall

It is a delicate, extremely thin, living membrane which closely invests the protoplast.

The composition of cell wall is variable among the different groups of fungi or between the different species of the same group. In the majority of fungi, the wall lacks cellulose but contains a form of chitin known as the fungus cellulose which is strictly not identical with insect chitin.

The suggested formula for fungus chitin is $(C_{22}H_{54}N_{21})_n$. Electron microscope studies reveal that chitin occurs as elongated variously oriented microfibrillar units. These are laid down in layers and form the basis of the structural rigidity of fungal cell walls.Moore and Mc Lear (1961) named it lomasome. Actually the plasma membrane is the surface layer of the protoplast altered to perform special functions. It is differentially permeable and shows a typical tripartite structure under the electron microscope. There is an electron dense layer on either side of the less dense central region.

The microfibril layers generally run parallel to the surface. Associated with the microfibrillar components is the nonfibrillar material. The chief chemical constituents are various polysaccharides, but proteins, lipids besides other substances have also been reported.

Chapter-7. LIFE CYCLE OF *Aspergillus*

Classification (According to Ainsworth)

Kingdom	:	Mycota
Division	:	Eumycota
Sub-division	:	Ascomycotina
Class	:	Plectomycetes
Genus	:	*Aspergillus*

Aspergillus, also called, *Eurotium* is a widely distributed genus among all the moulds occurring in the nature. They live mostly as a saprophytes on almost all the dead organic material like decaying vegetables, damp fruits, fatty substrata like butter, ghee, starchy material like bread, rice, syrups, jams, jellies and wood and leather goods. Some species of *Aspergillus* like *A. flavus*, *A. fumigatus* and *A. niger* cause disease of animals and human being. These diseases are known as aspergilloses. Some species e.g. *A. flavus*, *A. fumigatus* and *A. niger* are responsible for causing the a Otomycosis a diseases of human ear. Mohanty (1948) reported about 33 species of *Aspergillus* from India.

Vegetative structure : The mycelium is of *Aspergillus* is colourless or bright or pale coloured, or bearing a surface concentration of colouring matter. Mycelium consists of loosly interwoven mass of much branched septate hyphae. The plant body is mycelial. The mycelium consists of slender, tubular, pale coloured, extensively branched, thin walled hyphae. Some hyphae ramify superficially upon the substratum while some penetrate into the substratum to absorb the food material.

Each cell is multinucleate and is filled with granular cytoplasm, mitochondria, endoplasmic reticulum, ribosomes and vacuoles. The cross walls between the cells have a simple pore through which the cytoplasm of the adjacent cells remain continuous. Reserve food material is in the form of oil globules.

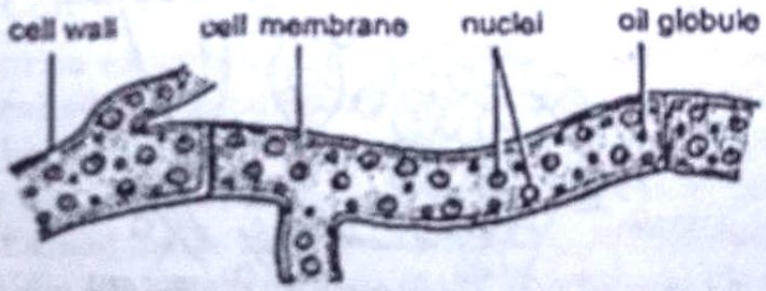

Fig. 1: Aspergillus: Vegetative structure

Reproduction: ***Aspergillus*** **reproduces by means of vegetative, asexual and sexual methods.**

of which the first one is meiotic. This results in the formation of eight haploid nuclei. Around each of these eight daughter nuclei a wall is secreted forming an ascospore. The mature asci are globose, ovoid or pear shaped. Soon after the development, the ascus wall, the ascogenous hyphae and tapetum degenerate and the ascospores are liberated in into the hollow cavity of cleistothecium.

Each ascospore is multinucleate and pulley wheel like structure but the two valves may be variously sculptured depending on the species. The rupture of cleistothecial wall liberates the ascospores, which on germination produce new mycelium.

Chapter-8. LIFE CYCLE OF YEAST (*Sachharomyces*)

Classification (According to Ainsworth)

Kingdom	:	Mycota
Division	:	Eumycota
Sub-division	:	Ascomycotina
Class	:	Hemiascomycocetes
Genus	:	*Saccharomyces*

The yeasts are wide spread in their distribution and grows saprophytically on the substratum rich in organic substrates that contain sugar, such as decaying vegetables ripe fruits and grains, sugary exudates of trees and nectar of flowers. They are also found in decaying organic matter, soil rich with humus and in milk products. It has the property of changing sugar into alcohol. This special power of yeast has been taken advantage of in developing certain important industries, particularly brewery and bakery. These are of considerable economic importance and are associated with many industries. Yeast are also important as a valuable source of vitamin while some of the species are parasitic and causes diseases of plants and animals. Some of the important genera of the yeast are *Schizosaccharomyces*, *Saccharomycodes*, *Saccharomyces*, *Nematospora*, *Hansenula* etc.

Vegetative structure :

Leeuwenhoek first microscopically examined yeast in the year 1680. Schwann (1836) in Germany discovered its true nature. Structurally, it is not composed of hyphae but it is simple and a single cell represents the whole body of the plant. It is very minute (5 –10 μm) in size and looks like a pinhead under the microscope. The yeast cells are very polymorphic and are capable of assuming various shapes depending upon the medium on which they grow. Each cell is colour

Chapter-9. INDUSTRIAL APPLICATION YEAST AND ASPERGILLUS

INDUSTRIAL APPLICATION OF YEAST

Yeast is mainly used for the fermentation of the carbohydrates hence the name Saccharomyces (Greek. Saccharon meaning sugar and mykes meaning fungi is applied to them. During respiration yeast cell oxidise sugar to form simple organic acid and releases energy. When the supply of free oxygen is restricted the organic acid is split into carbon dioxide and alcohol. These products are of no use to the yeast but are of immense value to the baking and brewing industries.

1. Baking and Brewing industry

In the baking carbon dioxide is an industrial product and alcohol is waste. The CO_2 is responsible for raising dough and giving spongy texture to bread.

The alcohol produced during the baking process is driven off as a by-product. In the brewery, on the other hand, alcohol is a valuable product. Commercial manufacture of ethyle alcohol is a large industry. Carbon dioxide, which is a by-product in the process, can be compressed into solid form.

In the view of industrial importance, the yeasts have been hybridised and certain domesticated strains, varieties and species have been developed by selection and breeding. These yeasts can synthesize vitamins and can ferment sugar.

2. Yeast cake industry

The extensive use of yeast in brewing and baking industries has given great impetus to the establishment of another important industry, it is in the preparation of yeast cake on commercial scale. Commercially the yeast cakes are prepared by pressing into cubes. In the laboratory the yeast cakes are placed in a warm sugary solution to demonstrate the fermentation process. The yeast cells are activated. The tiny yeast cells are rich in protein. Certain strains of yeast afford considerable fat. They are, therefore, mingled with other foodstuffs to increase their food value.

3. Production of vitamins

Fresh yeast cells are excellent source of vitamin b and g and thus an important source of highly valued substances. It is used in the preparation of vitamin B complex tablet. Compressed yeast is used as a source of vitamins and enzymes useful in the manufacture of syrups and confectionary products. *Ashby gosypii*, a filamentous yeast is used in the production of vitamin riboflavin.

4. Other uses

Yeast are also employed to flavour to cocoa beans. Besides the above mentioned uses of yeast, they are utilized in the medicine industry as a source of enzymes.

Industrial Application of *Aspergillus*

Aspergillus species is mostly known for its role as a pathogen. However,

UNIT 3.

Bryophytes

Chapter-10. VEGETATIVE REPRODUCTION IN BRYOPHYTES

Bryophytes show reproduction by vegetative methods, which is common mode of reproduction amongst them. This mode of reproduction does not involve fusion and meiosis. Correns (1899) and Cavers (1903) have given a comprehensive account of the vegetative propagation in bryophytes.

The following are some of the common methods of vegetative reproduction found amongst bryophytes:

(1) Fragmentation.

(2) Formation of tubers.

(3) Formation of gemmae.

(4) Formation of adventitious branches.

(5) Formation of innovations.

(6) Formation of primary and secondary protonema.

(7) Development of cladia.

(8) Persistent apices.

(9) By rhizoids

Besides, various modifications of above methods have also been reported.

(1) Fragmentation (By progressive death and decay of the thallus)

In bryophytes the growing part is located at the tip of the thallus. The posterior older portion of the thallus undergoes progressive death and decay. As the process of decay reaches up to the point of dichotomy, the young lobes of the thallus get separated (Fig. 1 A-C). These lobes, called **fragments,** grow into new individual plants.

Fragmentation is the most common method of propagation in the members of **Hepaticopsida (e.g.,** *Riccia, Marchantia, Plagiochasma),* Anthocerotopsida *(e.g., Anthoceros)* and some Bryidae (e.g., *Sphagnum).*