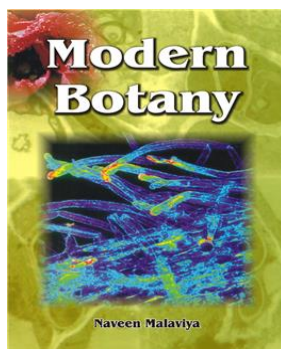


Modern Botany

[Naveen Malaviya](#)



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Blurb

The present book is a text book on modern topics of Botany. The first chapter of this book is on plasma membrane, wherein, details of transport mechanism is discussed. There are three sections in this book. Section I deals with the biochemistry and metabolism. Section II covers developmental physiology and the Section III is on plant biotechnology. In this section, Ti plasmid, transposable elements and transgenic plants are discussed in details. In this book there are separate chapters on bioinformatics and biosignalling. The text of this book is based on biochemical, physiological and molecular aspects, along with the modern and emerging ideas in Botany.

Foreword

Dr. S.M. Paul Khaurana

Vice Chancellor

Rani Durgavati Vishwavidyalaya, Jabalpur

Table of Contents

1. Plasma membrane

Structure, Membrane Model, Movement across cell membrane. Translocators, Pumps, Ion Channels, Aquaporins.

SECTION I : BIOCHEMISTRY AND METABOLISM

2. Metabolism and Bioenergetics

Metabolism, The Energy state of cell, Laws of Thermodynamics, Free Energy, Components of Electron Transport System, Electron Transport Chain, Phosphorylation.

3. Cell Biochemistry

Covalent, Non covalent bonds, Hydrogen bonds, Polar and non polar molecules, Acid Base and Buffers. Biochemistry of Carbohydrate: Monosaccharides, Disaccharides, Polysaccharides, Starch, Cellulose, Pectin. Biochemistry of Amino acid. Biochemistry of Proteins: Protein Structure. Biochemistry of Lipids: Fats, Steroids, Phospholipids. Biochemistry of Nucleic acid, Nitrogenous Base, Nucleoside and Nucleotide. Biosynthesis of purine and pyrimidine.

4. Enzyme

Nomenclature and Classification, Mechanism of Enzymatic reaction, Michaelis Menton equation, enzyme activity energy concept, general properties.

5. Photosynthesis

Historical background, Hill reaction, Red drop and Emerson effect, Photobiology, Photochemistry, Energy transfer, Light Harvesting, Photosynthetic unit and Reaction center. Thylakoid and location of pigments. Photosystem, Physiology of PS II, Role of cytochrome b6 f, Physiology of PS I, The electron transport system, photophosphorylation, Physiology of Photophosphorylation, ATP synthase. C3 plants: Calvin cycle, Enzymes of RPP, stoichiometry and energetics, regulation of calvin cycle, Sucrose synthesis, Starch synthesis. C4 plants: C4 pathway, enzymes of C4 pathway, anatomical features of C4 plants, C4 plants environmental regulation. CAM plants: metabolic pathway.

Enzymes of CAM.

6. Respiration

Glycolysis, Formation of Acetyl CoA, Krebs cycle, Mitochondrial electron transport, Pentose phosphate pathway.

7. Photorespiration

Mechanism, Enzymatic activities in Peroxisomes, Fate of glycolate pathway, Factors affecting photorespiration.

8. Nitrogen and Sulphur Assimilation

The nitrogen cycle, Biological nitrogen fixation, assimilation of nitrate. Sulphur cycle, Sulphate assimilation.

9. Nucleic Acid the Molecular Approach

Structure of DNA, Z DNA, Replication of DNA, DNA polymerase. The Mechanism, RNA structure and types, Genetic Code.

10. Amino Acid Metabolism

Synthesis and catabolism of amino acids.

11. Protein Synthesis

Some concepts and definitions, Transcription in prokaryotes, Transcription in eukaryotes, RNA processing, Translation, Post transitional modification of proteins.

12. Fat Metabolism

Biosynthesis of saturated fatty acid, the carbon source for fatty acid synthesis, formation of Malonyl CoA:Acetyl CoA carboxylase, homomeric and heteromeric forms of ACCase, biosynthesis cycle, the prokaryotic and eukaryotic pathways. The ER membrane is the site of fatty acid elongation and desaturation, the first double bond in a newly formed fatty acid. Biosynthesis of triacylglycerols, lipid catabolism □ oxidation.

SECTION II : DEVELOPMENTAL PHYSIOLOGY

13. Signal Transduction

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14. Plant Growth Regulators and Elicitors

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15. Photomorphogenesis

Phytochrome, Cryptochrome, The Chimeric Photoreceptors, Mechanism of Photoreceptor action. The Signal Transduction Chain, Seed Germination, Seedling and Vegetative Growth, Effect of light on pigment.

16. Physiology of Flowering

Photoperiodism, Role of Phytochrome, Florigen, The Genetic Aspect, The Constans and The Phloem Mobile Signal.

SECTION III : BIOTECHNOLOGY

17. Transformation and Transposons

Transformation using Plasmid of Agrobacterium: Molecular Biology of the Crown Gall, Ti Plasmid derived Vector system. Markers, The Gene transfer. Transposable elements, Transposition, Transposon Families, Transposon Tagging.

18. Transgenic Plants

Pest resistant and Herbicide Tolerant Plants, Microbial Pathogen resistant plants.

19. Tissue Culture

Historical background, Some basic terms and definitions. The different culture systems. The basic technique, Application of tissue culture.

20. Bioinformatics

Genomics, Proteomics, Genetic and Physical Mapping of Genes, Molecular markers, Artificial Chromosome, Database, Sequence alignment, algorithms. Application of bioinformatics, Bioinformatics in India.

Glossary

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