

CSIR-NET, DBT-JRF, ICMR-JRF, ICAR-NET, ARS, PSC  
& Other Competitive Exams



# Basic Concepts of Plant Biotechnology

(with MCQ's)



**Vijay Prakash  
Niraj Tripathi**

  
**Competition  
Tutor**



# **Basic Concepts of Plant Biotechnology** **(with MCQs)**

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## **Foreword**

Biotechnology is now beginning to be viewed as an informational science based on molecular mechanism of cell. In a simplistic sense, genetic information of a cell transmitting from parents to progeny through different molecular processes viz., replication, transcription and translation collectively called central dogma. This book evolved from a course in molecular biology that is a part of biotechnology and life sciences. This book regarding molecular biology and crop improvement is a large knowledge pack-capsule. This text will provide a quick tour of this subject and also test the grasping power of the reader and student which are preparing for many competition exams, CSIR-NET, DBT-JRF, ARS-NET, ICMR etc. as each chapter is following by objective question and answers. Hope this collection will help to move forward in the subject under target.

Place: Jabalpur

**V.S. Tomar**



## Preface

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The aim of the book entitled “**Basic Concepts of Plant Biotechnology (with MCQs)**” is to cover a wide area of Molecular Biology especially useful for the all graduate and post-graduate students of Agricultural Biotechnology and life sciences to quickly grasp the facts comprehensively. This book contains almost 3000 multiple choice Questions. This book will be proved very useful and increase the knowledge about molecular biology to all students of Life Sciences and Biotechnology who involve in the preparation of all competitive exams like ARS, ICAR-NET, CSIR-NET, DBT-JRF, ICMR-JRF, PSC etc. As with this first edition, we have been careful to include only the information that we believe is essential for good student understanding of the subject and for rapid revision when exams appear on the horizon. Do use the book not only to get to grips with the subject but also as already source of elusive information. We hope and believe that you will find it will be very useful for students.

We are deeply obligated to Dr. Sharad Tiwari, Professor and Director, Biotechnology Centre for this passionate and unreserved support, guidance, encouragement and patience which contributed to the success of this book. We are extremely thankful to Dr. Navinder Saini, Senior Scientist, Division of Genetics, IARI, New Delhi for his valuable and timely suggestions and your blessing during the preparation of book. We are extremely thankful to Dr. Anita Babbar, Professor, Department of Plant Breeding and Genetics, Dr. Iti Gontia-Mishra, Post-doctoral DBT Visiting Fellow, Biotechnology Centre, JNKVV, Jabalpur to share valuable experiences and support during this book. We thank to friends and colleagues, Dr. Swapnil Sapre (Ph.D. Scholar) and juniors Dr. Vishwa Vijay Thakur (Ph.D. Scholar), Dr. Satish Kachare (Ph.D. Scholar), Mr. Jagat Kumar (SRF, IARI, New Delhi), Dr. Arpita Shrivastava (Ph.D. Scholar), Akanksha Tiwari (Ph.D. Scholar), Ritu Sharma (Ph.D. Scholar), Sumana Sikadar (Ph.D. Scholar), Ruchika Mishra (Ph.D. Scholar), Nishtha Singh, Monika Mishra, for their utmost cooperation rendered at the times of need during the preparation of this book. Finally, we owe entire of this achievement to our parents who have tremendously encouraged us throughout our academic career as well as whole life.

– **Vijay Prakash**

– **Niraj Tripathi**



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## Synopsis

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The first edition of the book entitled “**Basic Concepts of Plant Biotechnology (with MCQs)**” has been publishing when the recombinant DNA and sequencing of human and many plant genomes have been completed. It prepared on the demand of students that have poor knowledge of molecular biology, especially central dogma, is process of transmission of genetic information in biological system. Therefore, we prepared and compiled many questions on central dogma inspired from different biotechnological and biochemical resource material. We have made an effort to include each simple and difficult question on central dogma as could be possible. This book contains almost 3000 multiple choice questions as well as fill in the blanks with answers covering all aspects of Molecular Biology systems of Prokaryotes and Eukaryotes. In writing the first edition, the aim is to provide all simple and difficult questions for weak students in plant Molecular Biology that have no more knowledge and have more problems in solving the questions. Therefore, in this book we included questions belongs to all basic concept of Molecular Biology which will provide strong knowledge to students preparing for competitive exams of life science like CSIR-NET, DBT-JRF, ICMR-JRF, ICAR-NET, ARS, PSC, graduate and post-graduate exams. In the first chapter, objective question on different biomolecules like carbohydrates, lipids, and proteins have been included to understand basic concepts about them. Second chapter includes fundamental questions for nucleic acid structure and functions have been presented that gives basic information about nucleic acid and its role in biological systems. Some questions are based on figures that illustrated key approaches for identifying possible structure, function and metabolism of nucleotides (purine and pyrimidine) and proteins. In third chapter, we summarized structure and functions of genes and chromosomes including their numbers and genome size in different organisms. Forth chapter describes DNA replication and its role in central dogma of molecular biology. Many questions on structures and functions of various enzymes, different factors and their active sites and role in replication provided in this chapter. In fifth chapter, we included causes of DNA damage and mutations, its processes and different DNA repair systems like base excision repair, SOS response etc. Sixth section provides a lot of questions on transcription and RNA processing including different transcription factors, their binding sites and role, RNA editing and intron splicing in prokaryotic and eukaryotic systems. Seventh chapter is based on process of protein synthesis, genetic codes, tRNA structure, amino acyl tRNA, translation in prokaryotes, translation in eukaryotes, protein targeting and protein glycosylation. Eighth chapter provides information about different gene expression systems, operon and tryptophan regulation, promoter, enhancers, open reading frames (ORFs), gene controlling, oncogenes and disease causing factors. We provided two special ninth and tenth chapters in last ‘Techniques and tools in molecular biology’ and ‘Biotechnology in Crop Improvement’ for agricultural biotechnology students in which all questions are included regarding to molecular and biotechnological techniques, methods and processes like ribozymes, molecular farming, MAS, QTL, RNAi, antisense RNA technology, recombinant DNA technology, microarray, sequencing, molecular markers etc., help in the improvement of traits, control of abiotic and biotic stress factors that negatively affect crop growth and development.

