

**BOOKS/PROCEEDINGS/  
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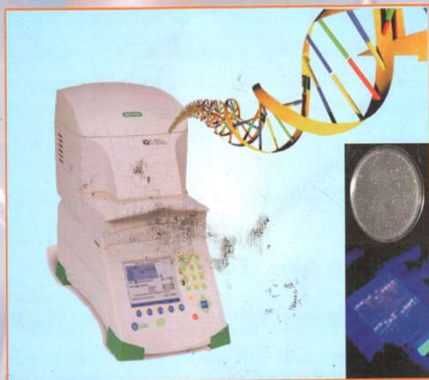
# TRAINING MANUALS

## Application of Molecular Tools & Advanced Biochemical Techniques in Agriculture

A Practical Manual

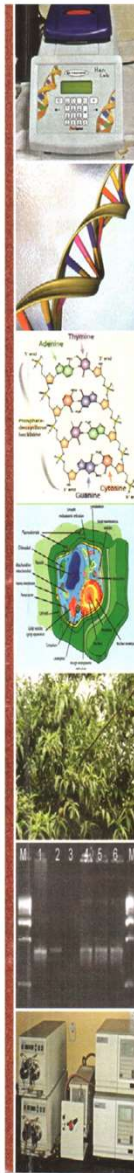
Dr. Pankaj Kumar  
Principal Coordinator

Dr. Jitender Singh  
Course Coordinator



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Department of Biochemistry & Physiology  
College of Biotechnology

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Modipuram Meerut- 250110 UP



## HAND ON TRAINING IN BIOTECHNOLOGY

(June 15 – July 14, 2011)

*A Practical Manual*

Funded by :  
Council of Science & Technology, Lucknow, UP

Compiled by :  
Pankaj Kumar  
Jitender Singh  
Sandeep Kumar  
Amit Kumar Singh



CENTRE OF EXCELLENCE IN AGRICULTURE BIOTECHNOLOGY  
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## A PRACTICAL MANUAL

on

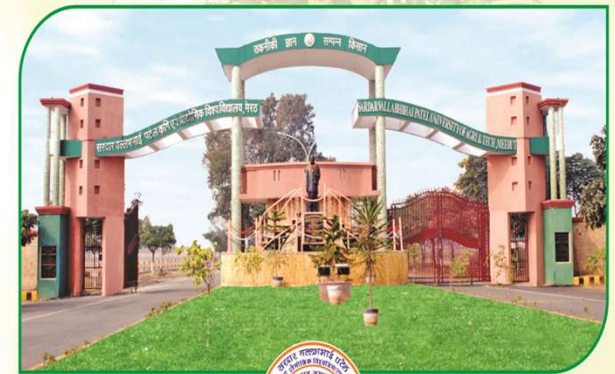
## Hands on Training in Molecular Biology and Their Application in Agriculture

(January 18 – February 07, 2012)

Jitender Singh  
Course Coordinator

Sandeep Kumar  
Course Co-coordinator

Pankaj Kumar  
Course Director




Organized by :  
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Practical Manual

Application of Biotechnological tools and Bioinformatics in Agriculture  
December 19, 2012 – January 08, 2013



Jitender Singh  
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Pankaj Kumar  
Course Director





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Training Manual 2013

TRAINING COURSE  
ON




APPLICATION OF MOLECULAR BIOLOGY TOOLS AND BIOINFORMATICS IN AGRICULTURE  
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*A Practical Manual*

**Jitender Singh**  
Coordinator, BIF & Course Coordinator

**Pankaj Kumar**  
Principal Coordinator, CoE & Course Coordinator

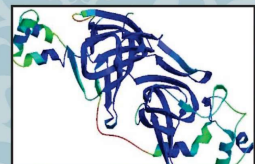

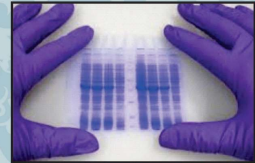
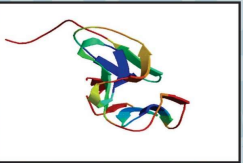




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TRAINING COURSE  
ON

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**Anil Sirohi**  
Course Director

**Pankaj Kumar**      **Jitender Singh**  
Course Coordinators

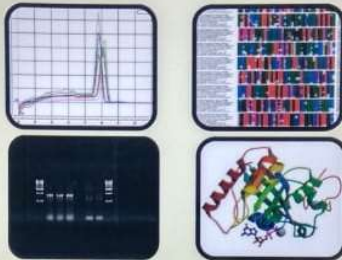
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Pankaj Kumar  
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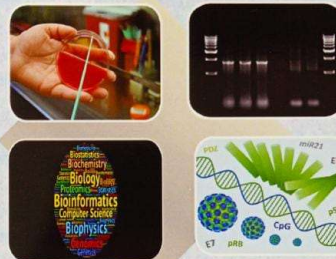
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TRAINING COURSE  
ON

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(February 12, 2020 to February 25, 2020 )

*A Practical Manual*



Jitender Singh  
Course Co-ordinator

Edited and Compiled by

Amit Kumar  
Course Co-ordinator

Pankaj Kumar  
Course Director

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December 11, 2020 to December 24, 2020



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Course Coordinator(s)

Dr. Jitender Singh  
Course Coordinator(s)

Dr. Pankaj Kumar  
Course Director

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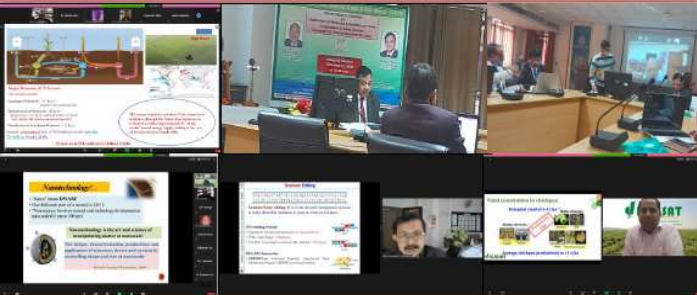
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# TRAINING/TEACHING MANUALS

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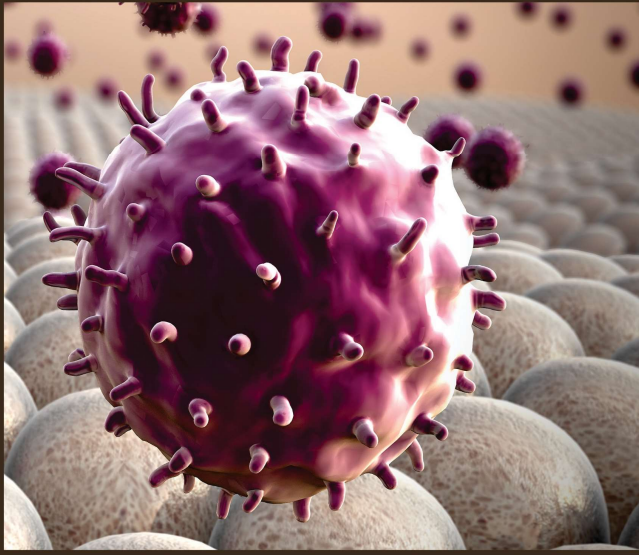
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**METHODS IN IMMUNOLOGY**  
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METHODS IN IMMUNOLOGY, A Laboratory Manual

Prepared and Edited by:  
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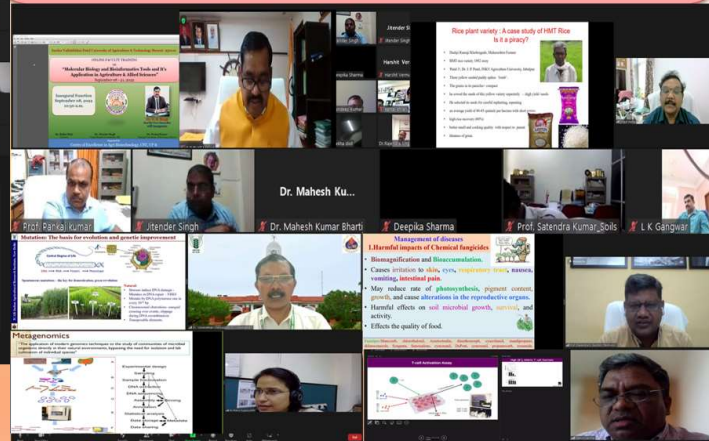
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**Dr. Rajendra Singh**

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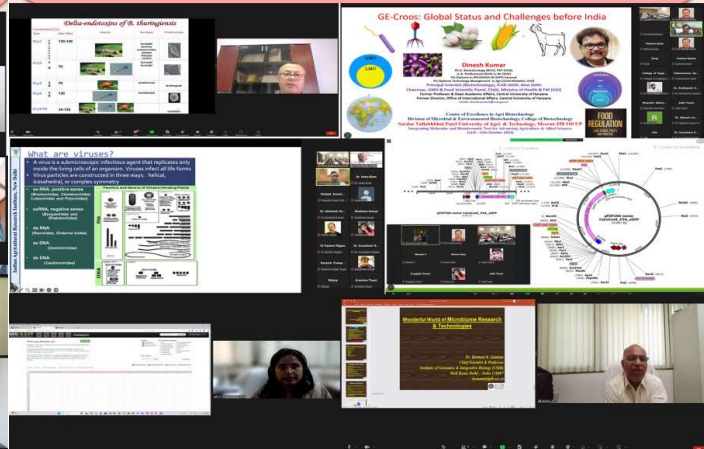
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**Dr. Rajendra Singh**

**Dr. Malyaj R Prajapati, RA, CoE in Ag. Biotech.**



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PRACTICAL MANUAL  
ON  
INTEGRATING MOLECULAR  
AND BIOINFORMATIC TOOLS  
FOR ADVANCING  
AGRICULTURE & ALLIED  
SCIENCES

PANKAJ KUMAR  
JITENDER SINGH  
MALYAJ R PRAJAPATI

Plant Biochemistry and Biotechnology: Unlocking the Green Goldmine

# Plant Biochemistry and Biotechnology: Unlocking the Green Goldmine

"Plant Biochemistry and Biotechnology: Unlocking the Green Goldmine" is an illuminating tome that navigates the intricate landscapes of plant science, probing the depths of biochemistry and biotechnology. Authored by experts in the field, the book serves as a comprehensive guide, offering a panoramic view of the diverse facets of plant life and its exploitation for innovative applications.

The book commences with an exploration of fundamental plant biochemistry, delving into the molecular mechanisms governing plant growth, development, and metabolism. It elucidates the intricate biochemical pathways that dictate plant responses to various stimuli, shedding light on the complexities underlying their physiological processes.

Moving beyond the realms of basic science, the text seamlessly transitions into the realm of biotechnology, showcasing the vast potential of plants as a wellspring of valuable resources. It discusses the applications of biotechnological tools in manipulating plant genetics, elucidating how genetic engineering and molecular breeding techniques can enhance crop traits, bolstering their resistance to pests, diseases, or environmental stressors.

Throughout its chapters, "Plant Biochemistry and Biotechnology: Unlocking the Green Goldmine" presents a balanced amalgamation of theoretical knowledge and practical insights. It serves as an invaluable resource for students, researchers, and professionals seeking a comprehensive understanding of plant biochemistry, biotechnology, and the myriad opportunities they offer for sustainable innovation and growth.



**Dr. Malyaj R. Prajapati**, Research Assistant, Centre of Excellence in Agriculture, Biotechnology, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture and Fisheries, Meerut, Malyaj R. Prajapati is a dedicated scholar who has made significant contributions in the fields of Molecular Biology, Biotechnology, and Bioinformatics. His academic journey has been marked by prestigious international fellowships, highlighting his commitment to advancing scientific knowledge. Malyaj R. Prajapati was awarded the Bioborn Student Fellowship by Bioborn, Spain. Additionally, he received the ICAR Fellowship from the International Centre for Genetic Engineering and Biotechnology (ICGEB) in Trieste, Italy. His contributions to scientific literature are noteworthy, with over 25 published papers that have enriched the understanding of Molecular Biology, Biotechnology, and Bioinformatics. Malyaj R. Prajapati's dedication to research and academic excellence continues to shape these disciplines and inspire fellow scholars.

**Dr. Mahesh Kumar Bharti**, Senior Assistant Professor, College of Veterinary and Animal Sciences, SVPUAT, Meerut. Dr. Mahesh is a Biochemist and Molecular Biologist with over 15 years of experience in teaching, research, and extension. He is a recipient of Junior and Senior research Fellowship from IICR, New Delhi during his doctoral research (DBWART, Punjab). He has also qualified the CSIR-NET. He has worked as a post-doctoral research fellow at national dairy research Institute, Karnal Haryana, where he worked on various aspects of lactational, Drought Tolerant (DT) and Nutraceuticals.

**Prof. Pankaj Kumar**, Professor, Biochemistry and Physiology, and serves as Head of Bioinformatics, College of Biotechnology, SVPUAT, Meerut. With over 20 years of experience in teaching, research and extension, Prof. Pankaj Kumar is a distinguished molecular and molecular biologist. His influence in the field of Biochemistry and Molecular Biology extends from his doctoral thesis to his service as a Guest Editor for the Green journal published by MDPI. He actively contributes his expertise to the peer review process and plays a pivotal role in shaping the discourse in various areas of life sciences, including diagnostics, genetic engineering, ecologies, plants, and molecular events.

Malyaj R. Prajapati  
Mahesh Kumar Bharti  
Pankaj Kumar



Malyaj R. Prajapati, M. K. Bharti & Pankaj Kumar



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# Plant Science Snapshots: Instant Notes and Techniques

Malyaj R Prajapati  
Mahesh Kumar Bharti & Pankaj Kumar

Welcome to a captivating journey into the heart of plant science. "Plant Science Snapshots: Instant Notes and Techniques" is your passport to the intricate and awe-inspiring realm of plants, where biochemistry meets biotechnology. In this indispensable guide, you'll explore the secrets behind plant growth, development, and their remarkable responses to the environment.

**Key Features:**

**Essential Knowledge at Your Fingertips:** Dive into the fundamental principles of plant biochemistry and biotechnology presented in concise and easy-to-understand language.

**Practical Techniques Unveiled:** Master the art of plant research with step-by-step instructions and real-world applications, from genetic engineering to tissue culture.

**Instant Reference:** Need quick answers? Find instant notes and summaries for easy recall and on-the-spot learning.

**Global Impact:** Discover how plant science plays a pivotal role in addressing pressing global challenges, including food security, sustainability, and environmental conservation.

**Why This Book Matters:**

As our world faces ever-increasing environmental and agricultural challenges, understanding plant science is more critical than ever. Whether you're a student, educator, researcher, or simply curious about the green world around you, "Plant Science Snapshots" equips you with the knowledge and tools to contribute to a brighter, more sustainable future.

Join the Green Revolution: Cultivate your curiosity, nurture your passion for plant science, and become a steward of our planet's green legacy. "Plant Science Snapshots" is your gateway to green knowledge and a brighter, greener tomorrow.



**Mr. Malyaj R Prajapati**, presently working as Research Assistant, Centre of Excellence in Agriculture & Biotechnology, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. Malyaj R Prajapati is a dedicated scholar who has made significant strides in the fields of Molecular Biology, Biotechnology and Biostatistics. His academic journey has been marked by prestigious international fellowships, highlighting his commitment to advancing scientific knowledge. Malyaj R Prajapati was awarded the BioBiom Student Fellowship by BioBiom, Spain. Additionally, he received the ICOSB Fellowship from the International Centre for Genetic Engineering and Biotechnology (ICGEB) in Trieste, Italy. His contributions to scientific research are noteworthy, with over 18 published papers that have enriched the understanding of Molecular Biology, Biotechnology, and Biostatistics. Malyaj R Prajapati's dedication to research and academic excellence continues to shape these disciplines and inspire fellow scholars.

**Dr. Mahesh Kumar Bharti**, presently working as Senior Assistant Professor, College of Veterinary and Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. Dr. Mahesh is a Biochemist and molecular biologist with over 12 years of experience in teaching, research and extension. He is recipient of Junior and Senior research Fellowships from UGC New Delhi during his doctoral research (ICPAAAT Patnaque). He has also qualified the CSIR-NET. He has worked as a post-doctoral research fellow at national dairy Research Institute, Karnal Haryana, where he worked on various aspects of Intellectual Property Rights (IPR) and Nanotechnology.

**Prof. Pankaj Kumar** holds the position of Professor, Biochemistry and Physiology and serves as Head of Biostatistics, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. With over 20 years of experience in teaching, research and extension, Prof. Pankaj Kumar is a distinguished biochemist and molecular biologist. His influence in the field of biochemistry and physiology extends to his editorial roles, as he serves as a Guest Editor for the Genes journal published by MDPI. He actively contributes his expertise to the peer review process and plays a pivotal role in shaping the discourse in various areas of life sciences, including diagnostics, genetics, fermentation, ecologies, plants, and molecular etc.



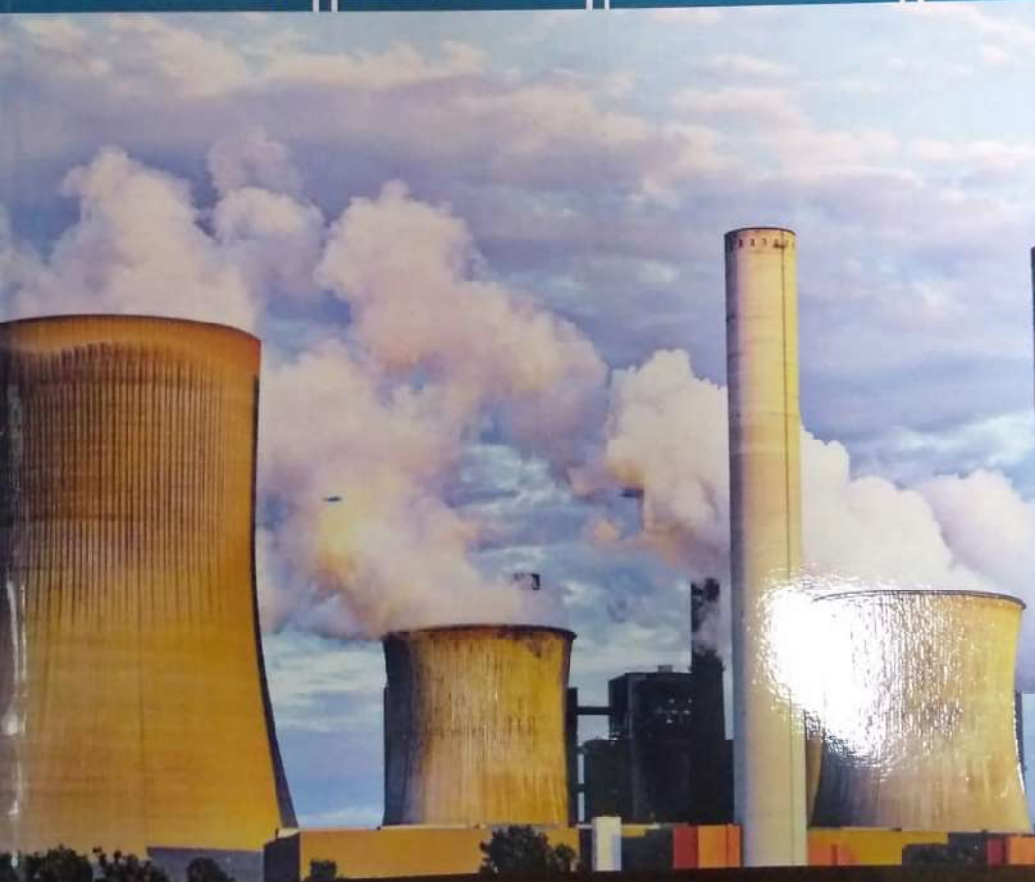
The logo for National Research & Journal Publication (NRJP) features the letters 'NOHEP' in a bold, sans-serif font. The 'O' is replaced by a stylized green leaf, and the 'H' is replaced by a stylized orange and yellow sun or leaf shape.

# Involvement and Impact of Pollutants and Carcinogens in Food

Edited By

Rekha Dixit

Pankaj Kumar



Edited By

## Prof. Rekha Dixit



Prof. Rekha Dixit, Head (Department of Commercial Biotechnology), College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, is actively engaged in teaching research and extension activities for the last 22 years on Plant Biochemistry, Molecular Biology and Genomics. She obtained her Ph. D. degree from Lucknow University on the topic, "Characterisation of psbB operon from chloroplast of *Populus deltoides* "under the guidance of Dr. P. V. Sane, Centre for Plant Molecular Biology, National Botanical Research Institute, Lucknow & Prof. G. G. Sanwal, Dept. Biochemistry, Lucknow University, Lucknow, India. Her post doctoral research experience involved studies relating to molecular mechanism of host-pathogen interaction in *O. sativa*-*M. grisea* pathosystem, association with "Indian Initiative for Rice Genome Sequencing- to identify Genes/ Markers of Agricultural Importance" and physical mapping of tomato genome in the DBT project entitled "Indian Initiative for tomato Genome Sequencing" at NRCPB, New Delhi. Apart from Research she has over twenty years of experience in teaching Graduate and postgraduate courses in Biochemistry/ Plant Physiology Molecular Biology/Genetic Engineering/Nanobiotechnology. Till date she has published about 30 research papers in different journals of national and international repute and more than 10 book chapters. She has given lead talks on emerging trends in Biotechnology in various International, National Conferences, workshops and Faculty Training programmes. Dr. Rekha Dixit has been awarded Excellence in Teaching Award, Best women Scientist Award and Best Teacher Award for her significant contributions. Two students have been awarded Ph. D. degree, Six students M. Phil. Degree and 15 students Postgraduate degree under her supervision and guidance and presently PhD and PG students are working with her on aspects related to Plant Biochemistry and Plant Genomics. She also organized various seminars/ conferences/ workshops/ training programs for promoting awareness about innovative trends in Plant and Environmental Biotechnology.

## Prof. Pankaj Kumar




Prof. Pankaj Kumar, Head (Biochemistry & Physiology), Principal Coordinator, Centre of Excellence in Ag-Biotechnology, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, UP-250 110. Prof. Kumar is a Plant Physiologist & Biochemistry Scientist with over twenty years of experience in teaching research and extension. He is recipient of Junior and senior research fellowships from ICAR, New Delhi for master's degree (UAS, Dharwad) and doctorate degrees (IARI, New Delhi) respectively. He has worked as Junior Scientist (Plant Physiology) at Hill Campus. G. B. Pant University of Agriculture & Technology, Pantnagar where he worked on physiology of hill crops viz. amaranth, buckwheat etc. and also on chilling tolerance studies on forest spp. of socio-economic importance. After joining at Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut as Associate Professor (Biochemistry & Physiology) he has established Centre of Excellence in Agriculture Biotechnology which is actively involved in research nutritional enrichment in pulses through molecular biology approaches and also on stress physiology in pulses. The centre has also been involved in human resource development where more than three hundred faculties and students have been trained in the field of molecular biology and bioinformatics. He has guided more than twenty-three master's and doctorate degree students. He had been elected Vice President (2012) and Zonal Secretary (North) 2013-14, Indian Society for Plant Physiology, New Delhi.

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### Dr. Jitender Singh

Dr. Jitender Singh is working as Associate Professor, Immunology at College of Biotechnology, Sardar Vallabhbhai Patel University, Meerut with teaching and research experience of more than 16 years. He did his Doctorate from Chaudhary Charan Singh University, Meerut and conducted his research work in Plant Virology at Advance Center for Plant Virology, Division of Plant Pathology, Indian Agriculture Research Institute, New Delhi-12, India. Dr. Singh is currently working on viruses and phytoplasmal diseases of horticultural crops of western Uttar Pradesh, India. Specific areas of research encompass both basic and applied components that include:

- Molecular and biotechnological approaches for characterization and control of viral and phytoplasmal diseases of horticultural crops.
- Marker assisted selection, Genomics, proteomics, molecular epidemiology, conventional and transgenic resistance, virus/Phytoplasma detection and diagnosis, and host-virus interactions:

Dr. Singh was associated with many extramural funded projects and was instrumental in the developed of Center of excellence in Agricultural Biotechnology and Bioinformatics Center at the university. He has conducted 10 winter/ refresher/ training courses for the Indian scientists on "Application of Molecular biology tools and bioinformatics in Agriculture". He was awarded with NAIP, ICAR International training Programme in 2011 to work at University of Queensland, Australia for a period of 03 months. Dr. Singh visited Australia, Singapore, Mauritius and Vietnam and participated and presented research work in international conferences and workshops. Dr. Singh has guided 14 post graduate students as major guide and published more than 50 research papers/review articles in journals of repute, 10 training manuals, 60GenBank Submissions. He is also having professional memberships of many scientific societies and working as reviewer for many national and International journals related to biotechnology and plant pathology.



### Prof. Pankaj Kumar

Prof. Pankaj Kumar, Head (Biochemistry & Physiology), Principal Coordinator, Centre of Excellence in Ag-Biotechnology, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, UP-250 110. Prof. Kumar is a Plant Physiologist & Biochemistry Scientist with over twenty years of experience in teaching research and extension. He is recipient of Junior and senior research fellowships from ICAR, New Delhi for master's degree (UAS, Dharwad) and doctorate degrees (IARI, New Delhi) respectively. He has worked as Junior Scientist (Plant Physiology) at Hill Campus, G. B. Pant University of Agriculture & Technology, Pantnagar where he worked on physiology of hill crops viz.

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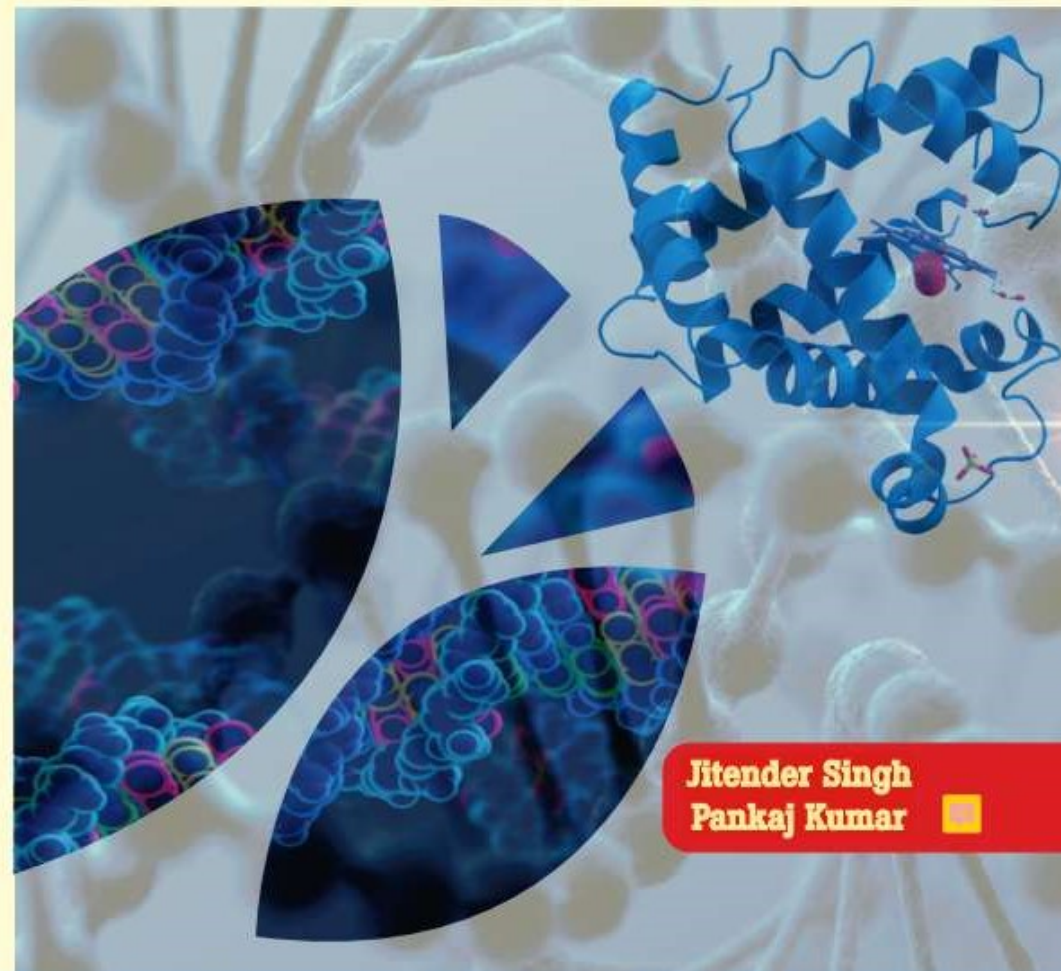
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# Application of Molecular and Bioinformatics Tools in Agriculture & Allied Sciences



Jitender Singh  
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**Dr. Mahesh Kumar Bharti**, presently working as Senior Assistant Professor, College of Veterinary and Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-200110. Dr. Mahesh is a Biochemist and molecular biologist with over 11 years of experience in teaching research and extension. He is a recipient of Junior and Senior Research Fellowship from UGC, New Delhi during his doctoral research (JRF/DAET Pantnagar). He has also qualified the CSIR-NET-JRF. He has worked as a post-doctoral research fellow at National Dairy Research Institute, Karnal, Haryana, where he worked on Nanotechnology approaches.



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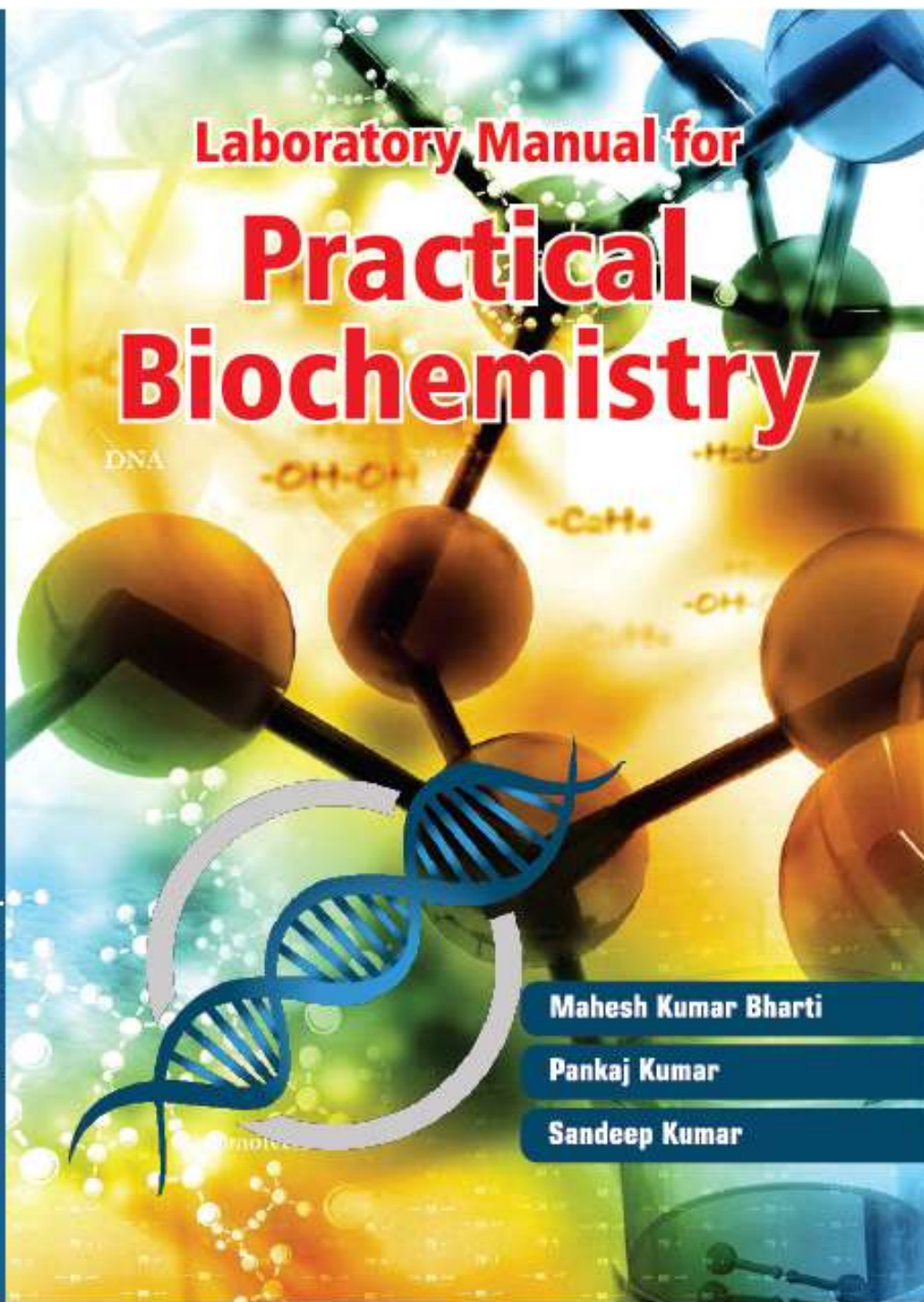
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Laboratory Manual for Practical Biochemistry

Mahesh Kumar Bharti  
Pankaj Kumar  
Sandeep Kumar

# Laboratory Manual for Practical Biochemistry



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**Sandeep Kumar**

Teaching Manual 2021



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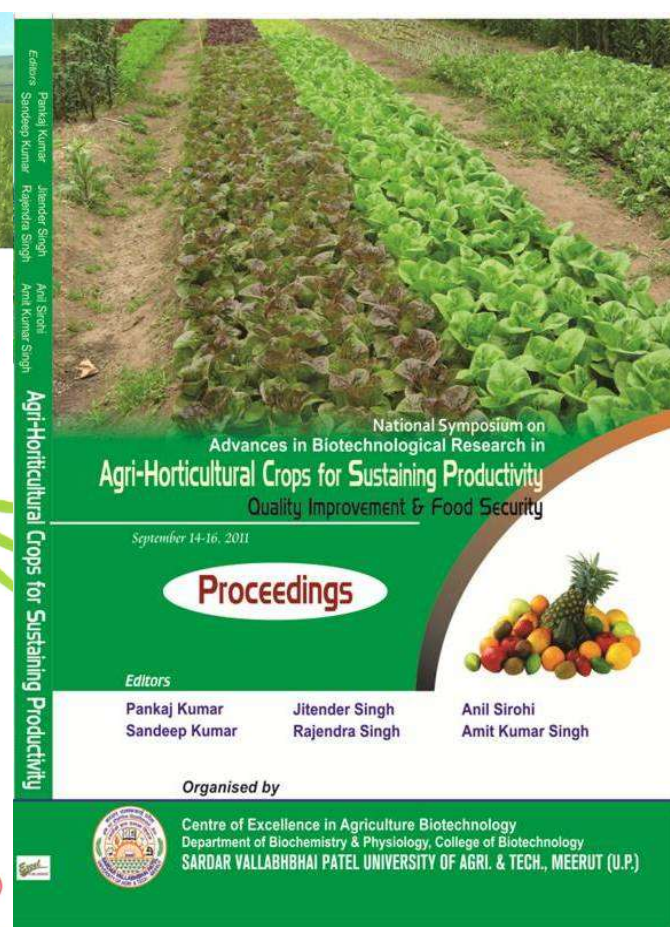
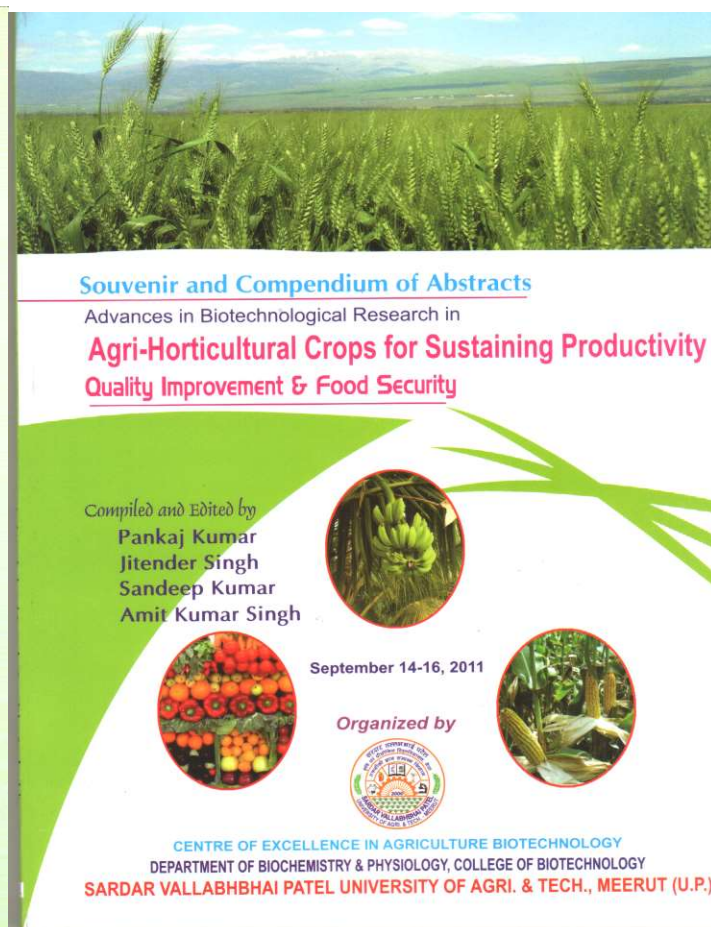


# Laboratory Manual for Enzymes and Enzyme Techniques



**Mahesh Kumar Bharti**  
**Pankaj Kumar**  
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# BOOKS/PROCEEDINGS



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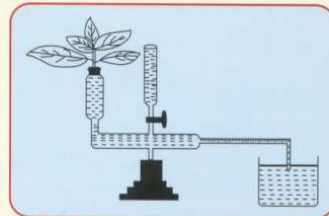
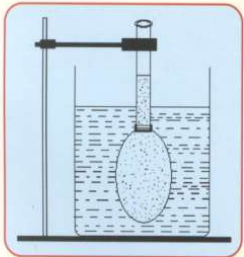
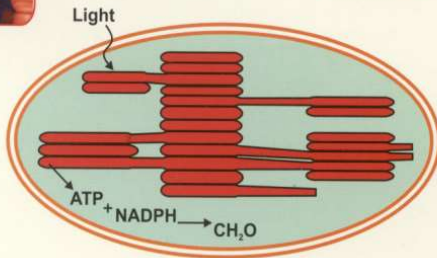
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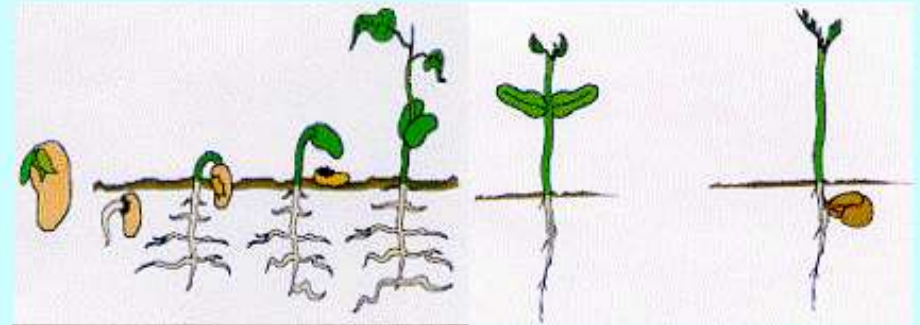
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# LABORATORY MANUAL ON PLANT PHYSIOLOGY



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# LABORATORY MANUAL ON SEED PHYSIOLOGY AND STORAGE



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Thanks