

About the Authors



Dr. Satybhhan Singh is an Assistant Professor (Agronomy), at School of Agricultural Sciences & Engineering, IFTM University, Moradabad (U.P.). Dr. Singh has more than 10 years experience in teaching and research. He has published 32 research papers and 6 popular articles in different journals of national and international repute, written 03 books and 04 book chapters to his credit. Dr. Singh received the "Young Scientist Award" in 2017 and again in 2018 for their outstanding contribution in the field of Agronomy. He has been also received "Excellence in Teaching Award" in 2019 and "Best Teacher Award" in 2021. Main thematic research area is nutrient management and cropping system research. He has supervised 26 PG students and 02 Ph.D. scholars.



Dr. Himanshu Trivedi is Doctorate in Horticulture (F&L) from GBPUA&T, Pantnagar in 2014. He has more than eight years of teaching and research experience, more than 60 publications in the form of research papers, book chapters, books, popular articles etc. He has qualified ASRB-NET in 2013 and 2021. Visited Thailand, Singapore, Indonesia and Vietnam for professional cause.



Dr. Virendra Singh presently working as Associate Professor & Director, School of Agricultural Sciences and Engineering, IFTM University, Moradabad (U.P.). Dr. Singh has completed his Master of Sciences in Agriculture (Agronomy) in year 2000 from CCS University, Meerut, and qualified ICAR-NET in 2004 and completed Ph.D. in 2016.

Dr. Singh has more than 16 years of experience in various corporate and teaching, research and administration. He has published 32 research papers, 02 book, 06 book chapters, and popular articles in different national and international repute journals. Dr. Singh received the Young Scientist Award in 2018 and Best Teacher Award in 2022 for their outstanding contribution in the field of Agronomy.

Main thematic research area is nutrient management and cropping system research and supervised more than 28 PG students and 03 Ph.D. scholars are registered. Dr. Singh actively involved in extension activities and time to time delivered radio and expert talks for the benefits of the community.

Published by

AkNik Publications ©

169, C-11, Sector - 3, Rohini,

Delhi - 110085, India

Toll Free (India): 18001234070

Email: aknikbooks@gmail.com



Dr. Satybhhan Singh
Dr. Himanshu Trivedi
Dr. Virendra Singh

CURRENT APPROACHES FOR SMART AGRICULTURE

Smart Agriculture

REGISTRAR
IFTM UNIVERSITY
MORADABAD

AKINIK PUBLICATIONS
NEW DELHI

Contents

S. No.	Chapters	Page No.
1.	Arbuscular mycorrhizal fungi (AMF): Phosphorus and zinc availability in plants	01-10
2.	Precision farming	11-26
3.	Production of quality planting bulbs of garlic through scientific approaches	27-38
4.	Tractor hazard and control	39-44
5.	Modern approaches for agricultural extension	45-54
6.	Precision agriculture: Future of India	55-61
7.	Government Agricultural Scheme (GAS)	63-75
8.	Basic terminology of farm power	77-85
9.	Laser land levelling: A resource conservation technology	87-94
10.	Application of remote sensing for precision water management	95-98
11.	The treatise of organic farming	99-113
12.	The role of drones in precision agriculture	115-129
13.	IDM: A new approach to disease management	131-140
14.	Scope of agri economics and farmer's reform law	141-154
15.	Importance of journalism in agriculture	155-164
16.	Utilization of solar energy for smart agriculture	165-174
17.	Crop residues management	175-183
18.	Quality of water for irrigation and management	185-194
19.	Types and importance of biofertilizers	195-204
20.	Agronomic bio fortification of cereals: An overview	205-213
21.	Nanotechnology and its applications in agriculture	215-223
22.	Organic farming principles, practices and advantages	225-238
23.	Ergonomic perspective in agriculture for safety of farm operators	239-252

Sanjeev Arora

REGISTRAR
IFTM UNIVERSITY
MORADABAD

24.	Fortification: Components of organic agriculture	253-258
25.	Automation of drip irrigation system	259-271
26.	Genetic engineering and GM crops	273-290
27.	Cultivation of trapa (Aquatic Plant) in fish pond and its role in natural fish food organisms production	291-299
28.	Abiotic stress in plants	301-308
29.	Scope of battery operated harvesters in indian agriculture system	309-321
30.	Paddy straw management machineries: Feasible and viable option for mitigating open field burning	323-334
31.	Sustainable agriculture	335-348
32.	Economic load dispatch with and without transmission losses	349-360
33.	Biotechnology: A smart way of breeding vegetable crops	361-381
34.	Chilli leaf curl viral disease and their management	383-396
35.	Urban horticulture: An overview	397-406
36.	Genetic engineering: It's role in agriculture	407-420
37.	Use of information and communication technology (ICT) in transfer of technology	421-428
38.	Bioenhancers: Boost for organic agriculture	429-444
39.	Post-harvest handling of cut flowers	445-462
40.	IPM strategies for the major insect pest of rice	463-470
41.	DNA Markers: Molecular tools for crop improvement	471-480
42.	Nutrient management strategies for improving maize productivity	481-506
43.	Natural farming: A dire necessity of hour	507-516

Sanjeev Brawaf
REGISTRAR
IFTM UNIVERSITY
MORADABAD

Chapter - 41

DNA Markers: Molecular Tools for Crop Improvement

Kanchan Lakhera and Kriti Shrinet

1. Introduction/Background

Agriculturists, crop growers, breeders over thousands of years have tried to improve the crop varieties for numerous characteristics like crop yield, fast growth, nutritional value, stress tolerance, disease resistance etc. In earlier times the crop improvement involved selection of plants with best phenotypic traits and collecting their seeds for the next growing season. With the advent of breeding technologies breeders were able to develop new inter and intra specific varieties but at the core of these conventional breeding program lies the selection of plants which was again based on the phenotypic characters. Though conventional methods of plant breeding helped in improving the agronomic traits of the plant varieties but it suffers from one major drawback that development of better crop varieties is restricted by the very long crop duration and that usually results in decades to develop a new cultivar of a crop.

With the introduction of molecular markers or DNA markers, these has proven to be a new powerful breeding tool to make more accurate and useful selections in breeding populations. DNA markers are immensely popular as molecular tools because these are inexpensive, stable, and easy to handle by the user. DNA marker is a sequence with a known location in a genome. Molecular Markers are used to 'flag' the position of a particular gene or the inheritance of a particular characteristic or gene. DNA markers can be part of a gene but often them neutral with no known function. Markers often reflect variation at the level of DNA sequences.

DNA markers have a wide range of applications in different areas of research like

- a) Markers are used as landmark in the construction of chromosome and genome maps.
- b) Molecular markers have played a major role in facilitating the implementation of molecular breeding in plants.
- c) Molecular markers can be employed for the detection of genetic variation, cultivar identification and genotyping.

Sania Arzaf Page | 473

REGISTRAR
IFTM UNIVERSITY
MORADABAD