Concept of AGRICULTURE SCIENCES

Edited by

- Md. Naiyar Ali
- Akhilesh Sah
- Ekhlaque Ahmad
- Abdul Majid Ansari
- Tajwar Izhar

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Preface

Agriculture is the foundation of food security, rural livelihoods, and sustainable economic development. With increasing population, changing climatic conditions, degradation of natural resources, and growing pressure on land and water resources, the application of scientific knowledge and modern technologies in agriculture has become increasingly important. Agricultural Sciences provide a comprehensive understanding of crop production, resource management, environmental interactions, and innovative technologies required for sustainable agricultural development.

This book, **"Concept of Agricultural Sciences,"** has been developed to provide students and other learners with a broad understanding of the fundamental concepts and emerging areas of modern agriculture. The book brings together important topics related to crop production, natural resource management, climate, soil, water, seeds, and modern agricultural technologies in a simple and systematic manner.

The book begins with the **Basics of Agrometeorology and Crop Ecology,** which provide an understanding of the influence of weather, climate, and ecological factors on crop growth and development. The concepts of **Tillage and Cropping Systems** explain the importance of appropriate soil manipulation and the scientific arrangement of crops for improving productivity and resource-use efficiency. **Dryland Agriculture** focuses on crop production under limited and uncertain water availability, while **Organic Farming, Conservation Agriculture, and Sustainable Agricultural Practices** emphasize the efficient utilization and conservation of natural resources.

The book also covers the **Fundamentals of Seed Production,** highlighting the importance of quality seed in achieving higher and stable crop yields. The inclusion of **Geo-informatics in Agriculture** introduces readers to the applications of remote sensing, GIS, GPS, and spatial technologies in agricultural planning and resource management. Nanotechnology in Agriculture presents emerging opportunities for improving the efficiency of agricultural inputs and developing innovative solutions for crop production.

Special emphasis has been given to **Agricultural Droughts and their Management,** an increasingly important subject under changing climatic conditions. The book also introduces **Crop Simulation Models,** which provide scientific tools for understanding crop–environment interactions, predicting crop growth and yield, and supporting decision-making under different management and climatic scenarios.

Thus, the book covers both **fundamental concepts and emerging dimensions of Agricultural Sciences,** linking traditional agricultural knowledge with modern scientific approaches. The contents have been organized to support easy understanding and to provide a foundation for further study and practical application.

It is hoped that this book will be useful to **students, teachers, researchers, extension personnel, and agricultural professionals** and will help readers develop a better understanding of the principles and technologies that contribute to productive, resilient, and sustainable agriculture. The ultimate aim is to promote scientific thinking and encourage the adoption of appropriate technologies for enhancing agricultural productivity while conserving natural resources for future generations.

Acknowledgement

The editors would like to express their sincere gratitude to all those who contributed directly or indirectly to the successful completion of the book Concept of Agriculture Sciences.

We are deeply thankful to the authors and contributors for sharing their valuable knowledge, expertise, and insights across various aspects of agricultural sciences. Their scholarly contributions have been instrumental in bringing together the concepts and developments presented in this book.

We extend our appreciation to our colleagues, teachers, researchers, agricultural professionals, and academic institutions for their encouragement, valuable suggestions, and continuous support during the preparation of this work.

We are also grateful to our friends and family members for their patience, encouragement, and moral support throughout the editorial process.

Finally, we express our sincere thanks to everyone who, in one way or another, contributed to the preparation and publication of this book. We hope that Concept of Agriculture Sciences will serve as a useful academic resource for students, teachers, researchers, and professionals in the field of agriculture.

Md. Naiyar Ali

Akhilesh Sah

Ekhlaque Ahmad

Abdul Majid Ansari

Tajwar Izhar

About the Editors

Dr. Md. Naiyar Ali has completed B.Sc. (Ag.) in 1998 and M.Sc. (Ag.) in 2001 from Birsa Agricultural University (BAU), Ranchi. He has appointed as Junior Scientist-cum-Assistant Professor at BAU in 2004. He awarded PhD degree in Agronomy from GBPUA&T, Pantnagar in 2012. He has supervised for six MSc students thesis research as major advisor. He has actively engaged in agronomical research cereal cops. He is life member of six professional societies and member of editorial advisory board of three national & international Journals. He is also reviewer of various national/international journals. He has published more than 38 research papers in reputed journals, two short communication, seven popular article and more than 45 abstracts in national and seven in international conferences. He delivered four invited lectures and presented 10 research papers (oral/poster) in different seminars, symposiums and conferences. He has felicitated by various professional societies. He has actively participated in transfer of technology activities like delivering lectures for officers/extension personnel who engaged in extension and development of agriculture, TV talk, Radio talk, Krishak Gosthi, Kisan Mela etc. for the farmers.

Dr. Akhilesh Sah has completed B.Sc. (Ag.) in 1998 and M.Sc. (Ag.) in 2001 from Birsa Agricultural University (BAU), Ranchi. He has appointed as Junior Scientist-cum-Assistant Professor at BAU in 2004. He awarded PhD degree in Agronomy (Gold Medallist) from BAU, Sabour, Bhagalpur, Bihar in 2017. He has actively engaged in agronomical research cereal cops. He is life member of four professional societies and member of editorial advisory board of three national & international Journals. He is also reviewer of various national/international journals. He has published more than 27 research papers in reputed journals, two short communication, three books and two book chapters, seven popular article and more than 39 abstracts in national and seven in international conferences. He delivered four invited lectures and presented eight research papers (oral/poster) in different seminars, symposiums and conferences. He has actively participated in transfer of technology activities like delivering lectures for officers/extension personnel who engaged in extension and development of agriculture, TV talk, Radio talk, Krishak Gosthi, Kisan Mela etc. for the farmers.

Dr. Ekhlaque Ahmad has completed B.Sc. (Ag.) in 1998 and M.Sc. (Ag.) in 2001 from Birsa Agricultural University (BAU), Ranchi. He has qualified ICAR-NET in 2002 and in the same year he engaged as Research Associate in NATP (MM, Wheat) at BAU, Ranchi. He has appointed as Junior Scientist-cum-Assistant Professor at BAU in 2004. He awarded PhD degree in Genetics & Plant Breeding from GBPUA&T, Pantnagar in 2012 as in-service. He has actively engaged in breeding of different cereals, pulses and oilseeds crops. He has associated with development and released of various crops variety viz., Rice-4, Wheat-1, Gram-1, Groundnud-1, and Linseed-2 and under process of release are Finger millet-2, Pigeonpea-1, Maize-2. He has trained in molecular technology for crop improvement from National Research Centre for Plant Biotechnology, New Delhi and attended for advance refresher courses from leading institutes. He is life member of eleven professional societies and member of editorial advisory board of six national & international Journals. He is also reviewer of various national/international journals. He has published more than 35 research papers in reputed journals, one book chapter, two short communication, four popular article and more than 45 abstracts in national and seven in international conferences. He delivered three invited lectures and presented 10 research papers (oral/poster) in different seminars, symposiums and conferences. He has felicitated by various professional societies viz., Agri-innovation award-2015, Young scientist award-2015, outstanding achievement award-2016, and distinguished scientist award-2017. He has actively participated in transfer of technology activities like delivering lectures for officers/extension personnel who engaged in extension and development of agriculture, TV talk, Radio talk, Krishak Gosthi, Kisan Mela etc. for the farmers.

Dr. Abdul Majid Ansari, Ph.D., devoted his academic career to Agriculture, particularly in the field of Horticulture as a Research and Extension worker. Dr. Ansarihas been working as a Junior Scientist-cum-Assistant Professor (Horticulture) at ZRS, Chianki, Birsa Agricultural University, Ranchi. Dr. Ansari did his Doctorate in Vegetable Science (2012) from G.B. Pant University of Agri & Tech., Pantnagar. He has contributed significantly in the field of vegetable breeding and developed a large number of advance lines of eggplant, tomato and vegetable peas. He has been maintaining alarge number of germplasms of different vegetableand fruit crops at the station. He has also made a vibrant link with farmers by advising them to promote scientific management of horticultural crops. He 36 research papers, three

review articles, 24 oral/poster presentation, three lead papers presentation, five books, four book chapters, 12 popular articles, four leaflet/folder, reviewed several research papers of three international journals viz., Scientia Horticulturae, Fruits Journal and AgronomyJournal and delivered 74 lectures in the different seminar/symposia/conference/workshop. He has a life membership of 10 scientific societies. He is working as a member of editorial board in the 8 National/International Journal of Agricultural and Allied Sciences and participated in the 9 refresher courses of horticultural importance.

Dr. (Mrs.) Tajwar Izhar is an Assistant Professor-cum-Scientist in the Forage Breeding Department, Livestock Production and Management, at Ranchi College of Veterinary Sciences and Animal Husbandry, Birsa Agricultural University (BAU), Ranchi. She was awarded the INSPIRE Fellowship by the Department of Science and Technology, Government of India for her PhD programme and received the Chancellor's Gold Medal for excellence in PhD research. Specializing in Forage breeding and Fodder production. She has published 28 research papers in reputed national and international journals. She is actively engaged in breeding programmes aimed at developing improved forage varieties to enhance livestock productivity. Dr. Izhar was also the recipient of the prestigious JSPS Fellowship in Tokyo, Japan. She participated in the 5th HOPE Meeting with Nobel Laureates held in Tokyo (26th February – 2nd March, 2013), where she was nominated by the Department of Science and Technology, Government of India. Her outstanding contributions to Livestock and forage science have earned her multiple national and international awards from various organizations. Her area of expertise is Forage breeding, Forage production and livestock nutrition.

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