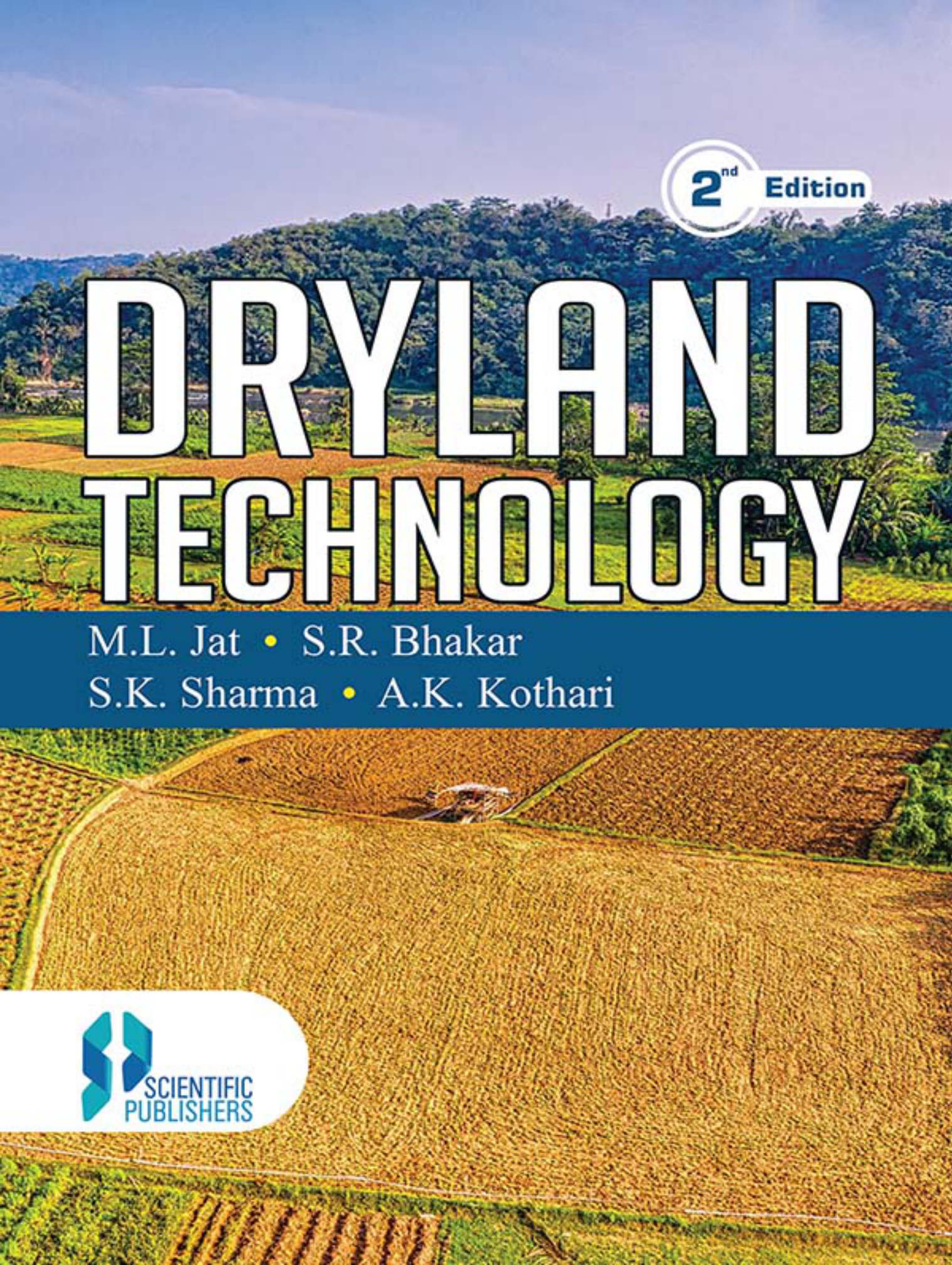
2nd Edition
DRYLAND
TECHNOLOGY
M.L. Jat • S.R. Bhakar
S.K. Sharma • A.K. Kothari
SCIENTIFIC
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Dryland Technology

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Dr. Shanti Kumar Sharma is presently working as Associate Professor (Agronomy) at MPUAT, Udaipur. He has been a recipient of PG Gold Medal and ICAR Junior and Senior Research Fellowship. He obtained Ph.D. degree from Indian Agricultural Research Institute, New Delhi, specializing in sustainable agriculture. He was awarded Jawahar Lal Nehru Young Scientist Award of Indian Council of Agricultural Research in 2002 for outstanding work in the field of Agronomy. He authored the first Distance Education Course on "Jaivik Krishi" (Organic Agriculture) in six volumes launched by RAU, Bikaner. For his contribution Dr. Sharma received Bikaner District Administration and RAU Vice-chancellor's award. He served as Member of the Board of Management, RAU, Bikaner.

Dr Anil Kumar Kothari is presently working as an Associate Professor, Soil and Water Engineering in AICRP on Operational Research Project on Dryland Agriculture since January, 2006. He obtained his Ph.D. Degree from MPUAT, Udaipur in 2007. He had received Gold Medal during his master degree. He has 27 years experience in the field of Dryland agriculture and handled seventeen projects funded by central and state government and ICAR like NICRA, RADP, NATP" Dryland mechani-zation", NATP "In-situ rain water conservation and water harvesting, a state government project "Action research Project on Drip irrigation in Cotton in Bhilwara district of Rajasthan".

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FOREWORD

Rainfed farming will remain the main stay for the livelihood support of millions of small and marginal farmers across the country even after realizing the complete irrigation potential. Further, climate change is posing a major challenge for rainfed agriculture and the constraints in further expansion of irrigated area in country. Impacts of climate change agriculture are being witnessed all over the world, but countries like India are more vulnerable in view of the high population pressure on agriculture and natural resources with poor coping mechanisms. Rainfall pattern is expected to create further moisture stress in area under dryland agriculture. Thus, for moderation of moisture to improve productivity of both crops and rainwater is essential. This can be achieved with the aid of application of dryland technology for livelihood security of dryland farmers. Thus, Dryland technology is the most important component for rainwater management and is the critical component of rainfed farming for livelihood security of dryland farmers.

The scope of dryland farming is wide and varied. It covers diversified areas such as understanding of dryland engineering, dryland farming and its concept, rainwater management for drought proofing and mitigation, risk management under drought situation, water harvesting either *in-situ* or *ex-situ* and their efficient recycling, reduction of water losses, design of water harvesting structures and irrigation systems and value addition of agricultural products, development of improved implements for different field operations and watershed management for better utilization of rainwater. This book deals with all these aspects. It amply serves a widely felt need for a suitable and comprehensive book on dryland engineering with emphasis on water harvesting either *in-situ* or *ex-situ*, the analysis of rainfall and water balance, efficient crop planning stress to enhance productivity, storage of grain, value addition of agricultural products and use of improved implements for energy minimization.

I very much appreciate the efforts made by Drs. M.L. Jat, S.R. Bhakar, S.K. Sharma and A.K. Kothari for bringing out this book on "Dryland Technology" which I hope will be useful for students, teachers and researchers, policy makers and other having interest in the areas related to Dryland Agriculture and Technologies.

10th May, 2012 **(Prof. O.P. Gill)**

PREFACE (2nd Edition)

The authors are greatly encouraged by the acceptance of the First Edition of Dryland Technology by students, professional engineers, scientists and readers from various areas of Dryland areas of India and other developing countries of Asia and Africa as well as many institutions globally. The need for revising the book was felt to made some corrections where ever necessary.

Dryland technology broadly involves several disciplines comprised of soil and water engineering (SWE), farm machinery and power engineering, hydrology, processing and agricultural sciences. It is equally urgent to agricultural scientists dealing with crop and animal husbandry, foresters, regional planners and extension workers. The main focus is to enhance productivity under Dryland ecosystem for livelihood security of Dryland farmers. For integrated management of land water resources in Dryland agriculture, the scientific knowledge of all these areas is required. Thus an attempt has been made to provide such a perspective to all stakeholders, students, scientists and planners. Basic knowledge of mathematics will be required for better understanding of some chapters dealing with design of rainwater harvesting structures either in situ or ex situ and irrigation method, rainfall characteristics, water balance, implement design, alternate land use planning etc.

The author wishes to make particular mention of the major contributions made by the publisher, Scientific Publishers (India), Jodhpur in the processing and editing of the book as well as providing excellent marketing support.

Authors

PREFACE (1st Edition)

This book is intended for students of agricultural engineering and agriculture studying in different institutions in India. It would also be useful for scientists, extension workers help to understand dryland agriculture to enhance productivity under dryland ecosystem for livelihood security of dryland farmers.

Dryland Technology broadly involves several disciplines comprised of Soil and Water Engineering (SWE), Farm machinery and Power Engineering, hydrology, processing and agricultural sciences. It is equally urgent to agricultural scientists dealing with crop and animal husbandry, foresters, regional planners and extension workers. The main focus is to enhance productivity under dryland ecosystem for livelihood security of dryland farmers. For integrated management of land and water resources in dryland agriculture, the scientific knowledge of all these areas is required. Thus an attempt has been made to provide such a perspective to all stakeholders, students, scientists and planners. Basic knowledge of mathematics will be required for better understanding of some chapters dealing with design of rainwater harvesting structures either *in situ* or *ex situ* and irrigation method, rainfall characteristics, water balance, implement design, alternate land use planning etc.

Indian agriculture is being described even today as a gamble of the monsoon and every year farmers' fate oscillate with the behaviour of monsoon. At present nearly 2/3rd of total area occupied under rain fed ecosystem in the country. Different types of droughts of varied intensities experienced at different growth stages such as early, mid and terminal season are common basic features of rain fed ecosystem. Thus, an attempt has been made to present the topics relevant to the needs of the dryland technology in different parts of country. All readers are welcomed for valuable criticism and suggestions to make this book more useful.

Authors

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