

# Arid Horticulture

## For Nutrition and Livelihood



T.A. More  
R. S. Singh  
R. Bhargava  
B. D. Sharma

# **ARID HORTICULTURE FOR NUTRITION AND LIVELIHOOD**

**Editors**

**T. A. More  
R. S. Singh  
R. Bhargava  
B. D. Sharma**



**Agrotech Publishing Academy  
Udaipur**

**Published by:**

**Mrs. Geeta Somani**

Agrotech Publishing Academy

11A-Vinayak Complex B

Durga Nursery Road

Udiapur - 313 001 (Rajasthan)

Mob.: 9414169635, 9413763031

email : agrotechbooks@rediffmail.com

Information contained in this book has been published by Agrotech Publishing Academy and has been obtained by its authors believed to be reliable and are correct to the best of their knowledge. However, the publisher and its authors shall in no event be liable for any errors, omissions or damage arising out of use of this information and specially disclaim any implied warranties or merchantability or fitness for any particular use. Disputes if any, are subjected to Udaipur jurisdiction only.

**First Printed 2012**

© Author

ISBN: (13) 978-81-8321-239-7  
(10) 81-8321-239-5

Typeset by :

**Rajeev Sen**

Mob.:09829585160

Email: rajeev.sen.2008@gmail.com

Printed at:

**Shri Krishna Offset Press**

Delhi - 93



**Deputy Director General**  
(Agricultural Extension)

Indian Council of Agricultural Research  
Krishi Anusandhan Bhawan-I,  
Pusa, New Delhi-110 012, India  
Phone: +91-11-25843277  
Fax: +91-11-25842968

**Dr. K. D. Kokate**

## **FOREWARD**

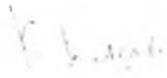
Horticulture has invariably improved the socio-economic status of the farmers. In the recent years, there has been phenomenal increase in area and production of fruit crops in India, which has brought 'Golden Revolution' in our country. The credit of this achievement of Golden Revolution goes to untiring efforts and the hard work of our scientists, extension personnel and adoption of the standardized technologies by the farmers of the country. It has also played an important role in women empowerment, employment opportunity through floriculture, nursery husbandry, seed production, processing and value addition, *etc.*

India is blessed with different types of agro-climatic conditions, ranging from extreme cold climate of Leh, Laddakh and dry hot arid parts in Rajasthan, which provides congenial conditions for cultivation of different types of arid horticultural crops. Presently, India is the 2<sup>nd</sup> largest producer of fruits and vegetables in the world, but our productivity is dismally low as compared to other developed countries. Many reasons have been assigned to low productivity of fruits in our country, but common fruit problems (non-availability of quality planting material, irregular bearing, unfruitfulness, fruit drop, fruit cracking, *etc.*), crop-specific chronic problems (mango malformation, guava wilt, citrus granulation, die-back, coconut wilt, *etc.*), physiological disorders, biotic stresses and abiotic stresses are the major constraints, confronting the researchers and fruit growers. Although, such problems have been documented briefly in different books, but not as ready reference to use in one book. Thus, there was a need to have a compiled literature

for all who are engaged in horticultural development and policy planners who are willing to develop policies for nutrition and livelihood security.

The efforts of Dr. T. A. More, R.S. Singh, R. Bhargava and B.D. Sharma in bringing out a comprehensive compilation of information in the form of a book entitled "**Arid Horticulture for Nutrition and Livelihood in Arid Region**" is praiseworthy. The book has covered the different aspects of the problems, prospects of horticultural crops' production in arid region and their solutions in a systematic and scientific manner. The major feature of this book is that the problems in crops production, gaps, marketing and their solutions have been specifically elaborated and discussed.

I hope that the book will be useful for the students, teachers, researchers, extension personnel and growers of our country, not only because of its reference material but also because of its simple and understandable language.

  
(K. D. Kokate)

New Delhi

## PREFACE

The vast land resource, rich genetic diversity with many landraces possessing resistance to biotic and abiotic stresses, animal based farming systems, conducive climatic conditions for production of quality fruits, vegetables and seed spices, opportunity for utilization of solar radiation and wind energy, sufficient working force of family labours, developing infrastructure facilities, *etc.* are the strength of arid horticulture development. Whereas, extreme of temperature, recurrent droughts, problem of wind erosion, frost during winter, saline underground water resource, sandy soils, limited growing period, biotic pressure, *etc.* are the limitations of the region, owing to occasional crop failure. The existing farming practices in the region are less efficient with respect to space and time, hence cannot support the livelihood of the inhabitant properly. For nutritional and income security, arid horticulture play a vital role in semi-arid and arid regions. Thus, appropriate and satisfactory safeguards have to be developed to make the system sustainable and profitable. The traditional wisdom of farmers of water harvesting in *khadins* and practice of mixed cropping under rainfed conditions in hot arid region of north western Rajasthan and growing of vegetables in low cost growing structures in cold region of Jammu and Kashmir gives an idea of utilizing farmers ITK for further refinement of technologies. The arid horticultural crops are also well prone to grow organically. In view of WTO regime of export requirement, the peculiar dry climate and warm blend in hot arid region offers opportunity for producing quality products of high health standard.

Despite the immense potential, arid horticulture has got emphasis very late; as research and development in horticulture were confined earlier to high value crops and resource rich situations. Now, it is realized that integration of arid horticulture in existing farming system can play vital role in diversification of untapped natural resources. Since, the development of arid horticulture is comparatively recent, hence the published literature on this vital subject is scanty. Therefore, an effort was made to compile the work done so far in the field of arid horticulture with special reference to

Indian scenario for nutrition and livelihood. The compilation of Arid Horticulture for nutrition and livelihood in arid region will serve as knowledge base of all those involved in research and development of arid horticulture. The authors are grateful to Dr. H. P. Singh, DDG (Hort.), I.C.A.R., New Delhi for their inspiration and guidance to bring out this publication. The guidance and support received from past and present Directors of CIAH, Bikaner is sincerely acknowledged. The authors are also thankful to the scientists, technical persons of CIAH for their support in compilation.

We are highly grateful to the contributors of the chapters who are experts in their fields for compilation of this publication. For timely printing of this book, authors are also thankful to publisher M/s. AGROTECH Publishing Academy, Udaipur.

*Authors*

# CONTENT

S. No.	Particular	Page No.
	<b>Forward</b>	
	<b>Preface</b>	
	<b>About the Editors</b>	
	<b>About the Book</b>	
1.	<b>Genetics Resource Management in Arid Horticultural Crops :</b> S. K. Malik, Rekha Chaudhary and S. K. Sharma	13
2.	<b>Breeding Strategies in Arid Vegetable Crops:</b> T. A. More and D. K. Samadia	21
3.	<b>Breeding and Improvement in Arid fruits:</b> S. H. Jalikop	35
4.	<b>Approaches for Molecular Breeding in Arid Horticultural Crops:</b> V. A. Parthasarathy and K. Nirmal Babu	46
5.	<b>Biotechnological Approaches in Arid Horticulture Crops:</b> Govind Singh	80
6.	<b>Key Role of Nursery Husbandry in Development of Arid Lands</b> R. S. Singh and R. Bhargava	90
7.	<b>Vegetables' Seed Production-A Profitable Venture in Arid Region</b> P. K. Yadav and A. K. Sharma	107
8.	<b>Floriculture and Landscaping for Arid Region</b> M. T. Patil, K. V. Prasad and V. S. Raju Dantuluri	131
9..	<b>Hi-tech Horticultural Interventions for Livelihood and Nutritional Security :</b> R. A. Kaushik and A. K. Shukla	140
10.	<b>Crop Diversification for Sustainable Production</b> K. R. Solanki, R. S. Singh and R. Bhargava	164
11.	<b>Augmenting Fodder Availability in Hot Arid Region : Need and Options</b> J.P. Singh and V. S. Rathore	185

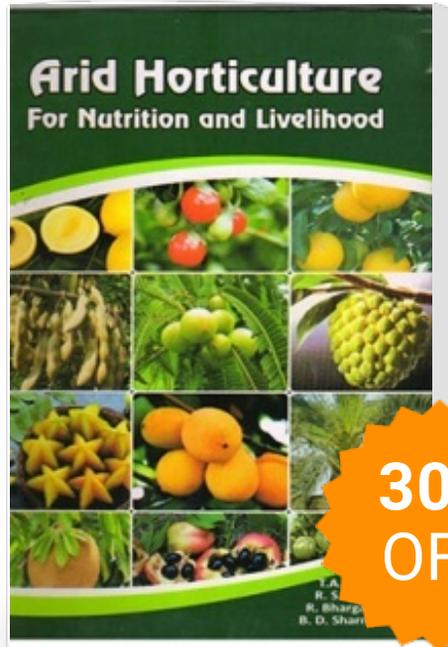
S. No.	Particular	Page No.
12.	Potential of Unexploited Fruits for Nutrition and Income Security R. S. Singh and A. K. Singh	205
13.	Water Productivity Enhancement of Horticultural Crops S. S. Magar	240
14.	Watershed Management for Horticultural Crops Production N. D. Yadav and B. D. Sharma	253
15.	Protected Cultivation :Opportunities and challenges T. A. More	267
16.	Physiological Basis of Tolerance for Abiotic Stresses in Horticultural Crops B. Lad and B.B. Dhakare	289
17.	Pest Management in Arid Fruit Crops with Special Reference to Export Oriented Fruit Production A. G. Chandle, V. D. Kale and S. R. Kulkarni	301
18.	Advances in Management of Insect/Pests in Arid Horticultural Crops B. G. Bagle	319
19.	Processing of Arid Horticultural Crops-Present Status & Future Prospects R. T. Patil, D. B. Singh and R. K. Gupta	336
20.	Constraints in Technology Adoption by the Farmers of Arid Region. S. R. Meena and T. A. More	359
	Subject Index	372

## ABOUT THE EDITORS

**Dr. T. A. More**, ARS completed his Master's degree in Horticulture from IARI, New Delhi during 1974 and Ph.D. during 1977 and Post Doctorate from Cornell University, USA (1981 to 1983). He joined as Scientist S-1 (Horticulture) at IARI, New Delhi in 1976 and holds various prestigious positions such as Professor (Horticulture) at MPKV, Rahuri in 1994, Head, Department of Horticulture, Associate Dean, COA, Dhule, Director Extension at MPKV, Rahuri, Director of Research, BSKKV, Dapoli, (Maharashtra), Director and PC at CIAH, Bikaner (Rajasthan), Director, IIVR, Varansi (UP). He is well known vegetable breeder and developed more than 30 varieties. His major area of research is crop improvement, protected cultivation, tissue culture and agro-techniques for semi-arid and arid regions. He is recipient of several prestigious awards and medals for significant contribution in the field of vegetable science. He is member of various professional societies at different positions, Expert Member of various committees. Dr. More has taught several courses and design UG/PG courses and guided 12 M.Sc. (Ag.) and 20 Ph. D. students. He has made significant contribution in development and release of 30 varieties/hybrids. He has visited Japan, USA and Israel. He has published more than 150 research papers in National and International journals, and 71 popular articles, 80 book chapters, 38 Technical publications, 13 Bulletins and 07 Extension bulletin and folders, 22 books, 195 papers in conference in his credit. Presently, Dr. More is holding the position of Vice Chancellor, M.P.K.V., Rahuri (Maharashtra).

**Dr. R. S. Singh**, ARS completed his Master's degree in Horticulture from G.B. Pant University of Agric. & Tech., Pant Nagar, Uttarakhand during 1981 and Ph.D. from Dr. B.R. Ambedkar University, Agra during 2000. He worked as Senior Research Fellow (INSA) at NBRI, Lucknow and as Res. Associate in Deptt. of Horticulture, G.B. Pant Univ. of Agric. & Tech., Pantnagar during

# Arid horticulture for nutrition and livelihood



Publisher : Agrotech  
Publications

ISBN : 9788183212397

Author : More T.A

Type the URL : <http://www.kopykitab.com/product/7090>



## Get this eBook