



## Innovative Saline Agriculture

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### Innovative Saline Agriculture From Springer

The land degradation due to salinity and waterlogging is a global phenomenon, afflicting about one billion hectares within the sovereign borders of at least 75 countries. Besides staring at the food security, it has far reaching and unacceptable socio-economic consequences since a large proportion of this land is inhabited by smallholder farmers. The anthropogenic-environmental changes and the climate change are further adding to the problem of salinity and waterlogging. The phenomenon of sea-level rise will bring more areas under waterlogged salinity due to inundation by sea water. Thus, dealing with the salinity in reality is becoming a highly onerous task owing to its complex nature, uncertainty and differential temporal and spatial impacts. Nevertheless, with the need to provide more food, feed, fuel, fodder and fiber to the expanding population, and non-availability of new productive land, there is a need for productivity enhancement of these lands. In fact, the salt-affected and waterlogged lands cannot be neglected since huge investments have been made throughout the world in the development of irrigation and drainage infrastructure. The social, economic and environmental costs being high for the on-and/off-farm reclamation techniques, saline agriculture including agroforestry inculcated with modern innovative techniques, is now emerging as a potential tool not only for arresting salinity and waterlogging but for other environmental services like mitigate climate change, sequester carbon and biodiversity restoration. This publication attempts to address a wide range of issues, principles and practices related to the salinity involved in rehabilitation of waterlogged saline soils and judicious use of saline waters including sea water. Many of the site specific case studies typical to the saline environment including coastal ecologies sustaining productivity, rendering environmental services, conserving biodiversity and mitigating climate change have been described in detail. Written by leading researchers and experts of their own fields, the book is a must, not only for salinity experts but also for policy makers, environmentalists, students and educationists alike. More importantly, it contributes to reversing the salinity trends and teaches to sustain with salinity ensuring the livelihood of resource-poor farming families leaving in harsh ecologies including coastal areas which are more vulnerable to climate change.

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## Editorial Review

### From the Back Cover

The land degradation due to salinity and waterlogging is a global phenomenon, afflicting about one billion hectares within the sovereign borders of at least 75 countries. Besides staring at the food security, it has far reaching and unacceptable socio-economic consequences since a large proportion of this land is inhabited by smallholder farmers. The anthropogenic-environmental changes and the climate change are further adding to the problem of salinity and waterlogging. The phenomenon of sea-level rise will bring more areas under waterlogged salinity due to inundation by sea water. Thus, dealing with the salinity in reality is becoming a highly onerous task owing to its complex nature, uncertainty and differential temporal and spatial impacts. Nevertheless, with the need to provide more food, feed, fuel, fodder and fiber to the expanding population, and non-availability of new productive land, there is a need for productivity enhancement of these lands. In fact, the salt-affected and waterlogged lands cannot be neglected since huge investments have been made throughout the world in the development of irrigation and drainage infrastructure. The social, economic and environmental costs being high for the on-and/off-farm reclamation techniques, saline agriculture including agroforestry inculcated with modern innovative techniques, is now emerging as a potential tool not only for arresting salinity and waterlogging but for other environmental services like mitigate climate change, sequester carbon and biodiversity restoration. This publication attempts to address a wide range of issues, principles and practices related to the salinity involved in rehabilitation of waterlogged saline soils and judicious use of saline waters including sea water. Many of the site specific case studies typical to the saline environment including coastal ecologies sustaining productivity, rendering environmental services, conserving biodiversity and mitigating climate change have been described in detail. Written by leading researchers and experts of their own fields, the book is a must, not only for salinity experts but also for policy makers, environmentalists, students and educationists alike. More importantly, it contributes to reversing the salinity trends and teaches to sustain with salinity ensuring the livelihood of resource-poor farming families leaving in harsh ecologies including coastal areas which are more vulnerable to climate change.

### About the Author

**Dr Jagdish Chander Dagar** has been well recognized both nationally and internationally and grown professionally through strong pursuit in ecological and agroforestry research which is evident from his 140 research papers published in peer-reviewed Journals, 120 book chapters and papers in proceedings of conferences/symposia, 12 books authored/edited, 10 research bulletins and more than 50 popular articles. He was the Assistant Director General at the head-quarters of ICAR and Emeritus Scientist. His research interest has been in the areas of biosaline agriculture, agroforestry, management of natural resources, rehabilitation of degraded lands, biodrainage, ethnobotany, plant ecology, climate change, sustainable agriculture and policy. Recognizing the research contributions, Dr Dagar has been conferred with several awards and honours: Sajjad Memorial Gold Medal (1973-74), Hari Om Asharam Trust Award of ICAR (2005), Swami Pranavananda Saraswati National Award (2005), CSSRI Excellence Award on Soil Salinity & Water Management (2007-09), Bharat Excellence Award & Gold Medal (2009), Dr KG Tejwani Award for Excellence in Agroforestry Research & Development (2010-11). Further, he is Fellow of National Academy of Agricultural Sciences, 2007 and Fellow & Life Member of several other professional societies: International Society of Tropical Ecology, 1982; Indian Botanical Society, 1993; National Institute of

Ecology, 1996; Range Management Society of India, 2007; National Environmental Science Academy, 2014; Andaman Science Association, 2015. He has also been consulting several national and international agencies such as FAO of UN, CIMMYT, and Haryana Forest Department. Dr Dagar has travelled in several countries in different capacities and had been member of several Research Advisory Committees and Management Committees of several ICAR Institutes and Board of Studies in Universities.

**Dr ParbodhChander Sharma** did his M.Sc. (1982) and Ph.D. (1986) from Punjab Agricultural University. Presently leading the program on improvement of rice, wheat, Indian mustard and chickpea for salt tolerance and high yield as Head, Division of Crop Improvement at Central Soil Salinity Research Institute, Karnal, India. He has made significant contributions in understanding the physiological mechanisms under salinity stress in Indian mustard, pearl millet, legumes and vegetables. He has been involved in developing salt tolerant high yielding genotypes of Indian mustard (CS 54 and CS 56), rice (CSR 46) and wheat (KRL 283). Further, three popular mega varieties of rice (Pusa 44, PR 114 and Sarjoo 52) have been improved for salinity tolerance by introgression of *SALTOL* QTL following molecular marker assisted backcross breeding. He has also developed and identified salt tolerant and sensitive mutants in mustard; and RILs and NILs for salt tolerance in mustard, rice and wheat. Another significant contribution is in developing crop and resource management practices for sustainable future cereal-based systems following conservation agriculture. Dr Sharma has led seven externally funded research projects. He has been awarded fellowships of three professional societies. He is the Associate Chief Editor of Indian Journal of Agricultural Research and also the General Secretary of Indian Society of Soil Salinity and Water Quality since 2011. He has widely travelled to many countries and has published 60 research articles in peer reviewed research journal including 21 in international journals.

**Dr Dinesh Kumar Sharma**, PhD from GB Pant University of Agriculture & Technology, served as Head, CSSRI-Regional Research Station, Lucknow before joining as Director, ICAR-CSSRI, Karnal during October, 2010. He is leading the research on reclamation and management of salt-affected soils. He conceptualized and demonstrated an Integrated Farming System (IFS) model with appropriate components of arable, vegetable, horticulture and fish farming to ensure regular income besides ensuring food and nutritional security at household level. He has handled various externally funded research projects funded by different national and international agencies. Dr Sharma is a widely travelled scientist and credited with more than 300 research papers including 58 in International journals. He has been honored with FAO fellowship and elected NAAS Fellow, besides being fellow of several other professional societies. He is currently the President of the Indian Society of Soil Salinity and Water Quality and Vice-President, Indian Society of Coastal Agricultural Research, Canning Town, West Bengal. He was awarded Hari Om Asharam Trust Award by ICAR; Biotech Product & Process Development and Commercialization Award by Ministry of Science and Technology, Govt. of India; ICAR-CSSRI Excellence Award on Soil Salinity and Water Management; and Ground Water Augmentation Award for Implementing Farmers' Participatory Action Research Programme, by the Ministry of Water Resources, Government of India.

**Dr Anil Kumar Singh** is currently the Vice Chancellor of the Rajmata Vijayraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh. Earlier he was the Deputy Director General (Natural Resource Management) in ICAR 2007-2012; Acting Director IARI 2005-2006; Project Director, Water Technology Centre 1999-2007. His areas of research interest have been soil-water-nutrient-plant interactions, crop growth simulation, irrigation water management, and integrated watershed management. Dr Singh had been a DAAD Fellow at University of Hohenheim, Germany and served in IRRI between 19993 and 1995. He is Fellow of several professional Societies including National Institute of Agricultural Sciences. Dr Singh is a recipient of several awards/hours: National Science Talent Scholarship, 1967-76; Gold Medal in Msc, 1972; IARI Best Teacher Award, 2005; Soil Conservation Society of India Gold Medal, 2006; Dr C Subramanium Outstanding Teacher Award, 2007-08; 10th Shri Hari Krishna Shastri Memorial Award, 2009; and several

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