

TASKS FOR VEGETATION SCIENCE – 47

Sabkha Ecosystems

Volume IV: Cash Crop Halophyte and Biodiversity Conservation

edited by M. Ajmal Khan, Benno Böer, Münir Öztürk,
Thabit Zahran Al Abdessalaam, Miguel Clüsener-Godt
and Bilquees Gul



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Tasks for Vegetation Science 47

SERIES EDITOR

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Volume IV: Cash Crop Halophyte
and Biodiversity Conservation

 Springer

With support of



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Foreword

Many years ago we started seriously looking into the possibility of developing coastal salt deserts into man-made ecosystems for agricultural productivity, with the food supply requirements of the growing global human population in mind. It was in Italy, on the island of Sicily that scientists enthusiastically invented the slogan “Cash Crop Halophytes”. Well, here is the first volume dealing with this subject. Lieth and Lieth supported this development as much as they could, and we are very happy to provide the foreword to this volume. Academicians in the past had limited access to the world of business people, land-owners, land-developers, bankers, politicians, and decision makers. This has fortunately changed. The world has begun to listen. This is important and needs to be continued.

Studies undertaken in the arid regions have revealed that various medicinal/ aromatic plants can be cultivated easily on slightly saline-alkaline soils using sea water irrigation. Many salt-tolerant plant taxa found in nature can be domesticated to provide better economic returns. In the same time they can assist ameliorating degraded saline lands, which is in the best economical interest of the rural communities. In order to advance food production on saline soils, more salt-tolerant species need to be catalogued with special reference to their ecology and salt tolerance. There is no dearth of biodiversity in saline habitats, particularly in coastal areas. What is needed is vision, planning and involvement of scientific and agricultural authorities and politicians.

As one of the results of our joint perseverance the International Society of Halophyte Utilization (ISHU) was formed. ISHU was at first located in Germany, and, later, based on a number of reasons, it was relocated to Egypt. From there it has been moved to Pakistan, where it is currently being located, at the University of Karachi, with the same acronym, but a new name: the Institute for Sustainable Halophyte Research. It has been supported by UNESCO. Numerous other projects generated good results, for example in the United Arab Emirates, Mexico, The Netherlands, Eritrea, and other countries. The editors tried to identify and invite them all to make contributions to this volume.

Springer as the selected publishing house has produced already three volumes of the book series on Sabkha Ecosystems: the first volume dealt with the definition and acceptance of the term “sabkha” for the international scientific community, as well as with the sabkha ecosystems of the Arabian Peninsula and adjacent countries. The second volume dealt with sabkha

ecosystems of West and Central Asia, and volume three brought information of sabkhat in Africa and southern Europe. We thank the colleagues from Springer for their continuous support.

Three more volumes are anticipated to complete this globally most comprehensive series on sabkha ecosystems:

- (a) Cash crop halophytes and biodiversity conservation
- (b) Sabkha ecosystems of the Americas
- (c) Sabkha ecosystems of Asia/Pacific

With this, the series will undoubtedly be the most comprehensive scientific documentation providing information about sabkha ecosystems, their ecology, their development potential, and heritage and education value.

The theme of Volume IV *Cash Crop Halophyte and Biodiversity Conservation* is very timely: no longer do we merely try to understand the importance of sabkha ecosystems for sustainable development, but we also start to understand the tremendous importance of sabkha for the conservation of halophyte biodiversity, the huge capacity of halophytes for the production of economically important products, but we also start understanding the capacity of halophytes to counter-act adverse environmental impacts, such as climate change, marine discharge waters, ecosystem restoration, and the enhancement of primary productivity.

This volume includes elaborations on the advantage of genetic manipulation of halophytes versus the genetic modification of conventional cash crops towards high salinity tolerance. It offers an initial insight into the possibility of reducing the adverse impacts of marine cooling waters for power plants via halophyte farms, sheds some light on the huge capacity of seagrass and macro-algae domestication, and, for a first, it discusses the possibility to reduce land-based marine pollution (nitrogene, phosphates, potassium) to minimize harmful-algal-blooms, as well as atmospheric carbon levels, via the establishment of floating mangroves in sub-tropical and tropical coastal environments.

The biodiversity conservation of halophytes has been addressed several times over the last few years, but the people of the world have still not developed a “World Halophyte Garden”, with the aim to conserve the entire halophyte germplasm of the world in one single garden, in order to have the genetic material available that will be needed for future coastal and marine restoration and development projects.

We would not like to conclude this foreword without paying tribute to the late President of the United Arab Emirates, and Ruler of Abu Dhabi, His Highness Sheikh Zayed bin Sultan al Nahayan: it was under his wise leadership that the UAE developed into the foremost country globally for the development of mangrove coverage. Unlike most other countries, the UAE has succeeded to increase their mangrove coverage significantly.

We wish the editors and authors of this volume the best of success and we encourage the scientific community to take the results, recommendations and suggestions very serious. Here are a number of highly important ideas and findings presented, which are of great value for mankind, to deal with issues of relevance to keep the global human life support systems intact, and with a special view to the global water crisis, the global food crisis, and above all,

the possibility to sequester carbon from the atmosphere, which is a key element regarding the very serious threat to human life support system: global climate change.

We have to realize: Halophytes are really a blessing for mankind. Let us use it.

Osnabrück, Germany

Prof. emeritus Dr. Helmut Lieth
and Mrs. Marina Lieth

Preface



The State of Qatar has undergone substantial economic and social developments during the last few decades, with the population nearing 1.9 million in 2013. To sustain this growth, demand for water has increased significantly in a region that is already known for its limited water resources. Though carbon-intensive desalinization of seawater has been used to redress water scarcity, this scenario makes agricultural food production very challenging. Food security is a real threat to development in the Arab world, where levels of reliance on food imports are among the highest in the world.

In November 2012, Qatar University supported the Qatar National Food Security Program, established by HH Sheikh Tamim Bin Hamad, in hosting an International Conference on *Food Security in Dry Lands*. The event brought together governmental officials, researchers, development experts, and representatives of civil society to dialogue about strategies for reducing food insecurity and boosting food production in dry lands.

As the national institution of higher education with a mission to support the social and economic development of the country, Qatar University is committed to the vision of HH Sheikh Hamad Bin Khalifa Al Thani for sustainable development. Through its various research centers and academic programs, the University contributes to the investigation of potential solutions to sustainability challenges. We believe that innovative education, collaborative research, and dialogue among stakeholders are absolutely essential in addressing the development challenges of our time.

It is with this background in mind that I accepted to write this Preface of *Sabkha Ecosystems Volume IV: Cash Crop Halophyte and Biodiversity Conservation*.

Most countries of the Arab Region suffer from a lack of freshwater, and this is certainly one of our most limiting resources. The situation is similar in other dry lands in the world. Climate change makes the unstable water-security situation even less predictable. Seawater, however, is available in abundance in our region and in many dry land countries. The international scientific community has made limited but steady progress developing salt-tolerant plant species as cash-crops, and attempts are ongoing to enhance research and implementation in farming and landscaping. The Gulf's marine ecosystems provide a particularly appealing opportunity for this area of research.

The editors and authors of this new volume have relentlessly continued to work on this important contribution towards food-security, and research and development of salt-tolerant cash-crops under hyper-saline conditions.

They have already produced three volumes, dealing with the Arabian Peninsula and adjacent countries, West and Central Asia, Africa and Southern Europe, and this new volume deals with global experiences and suggestions regarding cash crop halophytes and halophyte biodiversity conservation *ex situ* and *in situ*.

The fourth volume includes contributions from various parts of the world, and provides new information about several halophyte research and development aspects. The development aspects are more pronounced in comparison to the three earlier volumes, which indicates an increased interest in the application of salt-water and sea-water irrigation in agriculture.

I thank the contributors for their efforts and professionalism, and I encourage all concerned stakeholders, students, researchers, academicians, decision makers, donors, and the agricultural sector to actively support and participate in this important cause.

President, Qatar University,
Doha, Qatar

Sheikha Abdulla Al Misnad, Ph.D.

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