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Editors

Management and Development of Agricultural and Natural Resources in Egypt's Desert

 Springer

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Preface

Egyptian deserts forms about 96% of the total area of Egypt. These vast deserts could represent a vital part of the future of the development of Egypt to meet the challenges facing Egypt to satisfy increased demand of food and economic growth while the population is rapidly increasing. Therefore, this volume focuses on the natural and agricultural resources in Egypt's deserts and the means of their sustainable management and development. The book consists of 20 chapters divided into eight parts and contributed by more than 18 scientists, experts specialists and researchers in the field of natural and agriculture resources.

The first part is an introduction to the volume, and it consists of one chapter. The editors covered and present a comprehensive overview of almost all topics related to the natural and agricultural resources in Egypt's deserts to provide a background for the volume subject.

The second part consists of eight chapters dealing with the soil resources and their management in Egypt's deserts. The chapter "[An Overview of Lakes and Depressions' Environments in the Egyptian Deserts](#)" focuses on the land resources status of Egypt's deserts' lakes and depressions where Egypt's deserts are divided to three zones from the point of view of lakes and depressions. Also, the challenges facing the sustainable development of these lakes are identified. The second chapter which is titled "[Types and Distribution of Calcareous Soil in Egypt](#)" provides unique knowledge on Egyptian calcareous soils as follows: definition of calcareous soil, types and distribution, the particle size distribution of carbonate, physical and chemical properties, mineralogy, fertility status and their management practices and using saline water in irrigation and soil management. In the third chapter "[Re-inviting Mining for Egypt—A Framework for Small and Artisanal Mining](#)," the author defines the small-scale mining as any activity capable of extracting 10 tons per hour or less, where many of the potential mining sites need infrastructure such as bringing water and power. Consequently, the author discusses the establishment of pilot projects for cooperative mining and to adopt regulations on tax and royalties exemptions to foster small-scale mining and mineral processing in an Egyptian context. The fourth chapter titled "[Assessment of Microbial Biota in Some Localities in the Egyptian Desert Soils](#)" comprises determination of total microbial counts in the different regions in

the Egyptian deserts. It also includes the determination and existence of beneficial microorganisms and determination of CO₂ evolution as an indicator to microbial activities in these soils. The next chapter is titled “[Incidence and Impact of Some Heavy Metals Pollutants in Some of the Different Newly Developed Regions, Egypt.](#)” It briefly provides sufficient information on the environmental heavy metal pollution in different newly developed regions in Egypt’s deserts. The authors summarize the knowledge of higher plant responses to cadmium, lead, chromium and aluminum which act as vital environmental pollutants. Knowledge concerning metal sources, metal toxicity, presence in Egypt’s plants and soils. Also, the factors affecting metal behavior in soil and soil remediation including traditional and evaluation of some biological remediation are discussed.

The third part consists of three chapters and deals with development and sustainability of Egypt’s deserts’ soil resources. The chapter “[Sustainable Soil Management to Mitigate Soil Erosion Hazards in Egypt](#)” presents general lights on erosion types and their processes as well as focuses on the activities of soil including indicators, drivers, water and wind erosion modules applied. In addition, it includes the rate of soil erosion and management practices with emphasizing on the sustainable for controlling soil erosion for mitigating soil erosion hazards. In the chapter titled “[Sustainable Development of Microbial Community in Some Localities in the Desert Soil of Egypt,](#)” the authors explain the use of wide variety of plant growth promoting rhizobacteria (PGPR) and its associates, and PGPR benefits plant and soil through different mechanisms to improve soil properties and stimulating microbial community in rhizosphere of cultivated plants. On the other hand, the chapter titled “[Bio-fertilizers for Sustainable Agriculture Development Under Salinity Stress](#)” illustrates a variety of mechanisms that efficient microorganisms used for stimulating the plant growth in salt-affected soils and focuses on the findings of the most recent research studies on the use of biological fertilizers in salt-affected regions to facilitates and enhance the development of the agricultural sector.

The fourth part consists of two chapters dealing with the weeds in the Egypt’s deserts and their management. The first chapter is titled “[Multi-task of Weed Plants in Desert Environment.](#)” It presents the opportunities of weed plants in various fields that facilitate the social–ecological life of desert settlers and has a great impact in the future as renewable resources for food and fodders. It also provides an overview of weed plants roles in sand dune fixation, protecting desert fertile soil from degradation. The important role of weed plants to increase soil fertility and its impact on growing of the crops and their productivities is presented. The second chapter which is titled “[Ecological Management of Weeds in Desert Regions](#)” presents an overview of sustainable management of weeds species in cultivated and non-cultivated desert lands. It stresses on the problems facing weeds in Egypt’s deserts, especially in the newly reclaimed lands and the concerns of weed biology and various ecological characteristics included, factors affecting weed seed production and dispersion as well as spreading over desert cultivation.

The fifth part consists of two chapters to investigate the insects in the Egypt’s deserts and their management. The chapter titled “[Entomofaunal Communities in Desert Ecosystems](#)” is divided into two parts. It briefly sheds light on the natural

desert ecosystem at the first part with emphasizing on the interactions among entomofaunal communities in its second one. The intention beyond such reviewing study is to clarify the adaptive and resilient interactions of desert insect communities with the surrounding components to conserve their diversified state that is considered as a vital and significant principle in the desert ecosystem biodiversity conservation as well. The second chapter titled “[Sustainable Management of Insect Communities in the Cultivated Desert Regions](#)” focuses on the returned impact of desert cultivation on insect communities including the deterioration of insect diversity as species and functional groups following the agriculture expansion and the extended negative impact on the outputs of the cultivation process as well. Also, the chapters briefly highlight the concepts of both desert eco- and agroeco-systems, the degree of similarities between them and the environmental practices that should be considered under the umbrella of “agro-ecology” approach to simulate the natural hierarchy levels in the ecosystem under the desert agro-ecosystem. The final part of this chapter spots on the efforts that had been exerted to fulfill the sustainable management of entomofaunal communities at the Egypt’s deserts areas.

The sixth part consists of three chapters to explore the diversity and development of wild plants in the Egyptian deserts. The first chapter “[Microhabitats Supporting Endemic Plants in Sinai, Egypt](#)” classifies, assesses and analyzes the microhabitats supporting the globally significant species and their characteristics, as well as the threats, facing the conservation of the endemic plants in Sinai Peninsula. The second chapter titled “[Plant Diversity in the Egyptian Oases of Western Desert](#)” discusses the plant diversity of seven oases in the Western desert of Egypt including the diversity of habitats, floristic composition, life form of plants, distribution of phytogeographical regions and the vegetation diversity. These oases are Siwa, Moghra, Bahariya, Wadi El Natrun, Kharga, Dakhla and Dungul. The third chapter focuses on “[Potentialities of Halophytes in the Egyptian Deserts as Economic Plants](#)” to evaluate the potential of Egyptian halophytes for wide economic use in arid regions in light of the progressive shortage of fresh water resources and soil salinization. Major topics are to identify and select plant species tolerant to salt stress to evaluate the possible use of nonconventional water such as seawater and severe saline water of wells. It also highlights the potential importance of the halophytes in the field of human or animal nutrition, medicine, fiber materials, oil and their other uses in bioremediation wastewater and salt-affected soil.

The seventh part consists of three chapters to cover the development of plant food resources. The chapter titled “[Olive Oil and Rural Development in Egyptian Deserts](#)” explains the means of maximizing the economic value of olive oil by improving the oil yield and quality through the application of good manufacturing practices and paying attention to the factors affecting olive oil yield and quality. The chapter titled “[Food Processing of Date Palm Fruits in Sinai](#)” describes the appropriate drying method of Hayany and Amry dates. It also discusses how to improve the nutritional and caloric values by fortification date paste with different protein sources to produce high-quality products of date.

The third chapter in this part deals with the development of animal resources in the Egypt's deserts. It is titled “Feeding Camels on Halophytic Plants and Their Effects on Meat Quality Characteristics and Products.” It sheds light on the effect of feeding camels on some halophytic plants (*Acacia*, *Atriplex*) and their relationship with the physical, chemical, organoleptic properties of camel meat under Egyptian conditions. It also presents the impact of feeding such forage on daily gain rate, feed conversion efficiency in addition to the economic evaluation. The dressing percentage, edible and non-edible parts and wholesale cuts of camel carcass are also discussed.

The volume ends with the conclusions part which includes one chapter to present an update of the literatures related to the topics of the book and briefly summarizes the most significant conclusions and recommendations of the volume.

The editors would like to express their great thanks and their special appreciation to all authors who have contributed to this volume. Without their patience and effort in writing and revising the different versions of the chapters to satisfy the high-quality standards of Springer, it would not have been possible to produce this volume and make it a reality. All appreciation and thanks must be extended to include all the members of the Springer team who have worked long and hard to produce this volume and make it a reality for the researchers, graduate students and scientists around the globe. We must thank all the reviewers and experts who contributed to the review processes of the volume chapters.

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The volume editors would be so pleased to receive any comments and feedback to improve future editions. Comments, feedback, suggestions for improvement or new chapters for the next editions are much welcomed and can be sent directly to the volume editors.

Zagazig, Egypt
Cairo, Egypt
May 2019

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