

Preface

The Intergovernmental Panel on Climate Change states that ‘water and its availability and quality, will be the main pressures on, and issues for, societies and the environment under climate change’. Accordingly, it is expected that climate change will induce disruption in food production systems in both rain-fed and irrigated areas in Egypt. Scattered assessment studies were done in Egypt on the effect of climate change on individual crops, in terms of its productivity and water requirements. However, there is a lack of knowledge on the effect of climate change on crops structure, as a whole in Egypt. Thus, the limitation of these previous studies inspired us to write this book. In this book, we suggested new crops structure under rain-fed in North Egypt and under surface irrigation in Nile Delta and Valley, taking into account sustainability of water and soil resources (present and future in 2030).

In Chap. 1, we calculated potential evapotranspiration in four agro-ecological zones in Egypt: rain-fed agriculture in low-quality soils, irrigated agriculture in clay fertile soil with moderate climate, irrigated agriculture in clay fertile soil with hot climate, and irrigated agriculture in salt-affected soil with moderate climate. We also followed a methodology to reduce uncertainty in the projection of the effect of climate change on potential evapotranspiration, which resulted in achieving higher level of certainty in the prediction of weather elements with 92 % degree of accuracy. These values were used in the following chapters to calculate current and future crops water requirements.

In Chap. 2, we tried to close the gap in our understanding on how climate would affect sustainability in rain-fed area. Using integrated modeling approach to simulate the effect of application of supplementary irrigation and addition of manure on growing crops under current and future climate resulted in reducing its vulnerability. The use of crop rotations and interplanting as adaptation to climate change was also assessed.

In Chaps. 3 and 4, we suggested a management package to overcome water scarcity conditions in clay fertile soil in moderate and hot climates in Egypt. It included precise land leveling and cultivation on raised beds to save 20 % of the

applied water to surface irrigation, as well as cultivation of legume crop between winter and summer crops and implementing different intercropping systems in both locations. In addition, in Chap. 4, where sugarcane is the main crop, the effect of intercropping winter and summer crops on it was assessed to maximize land and water productivity.

In Chap. 5, we assessed the effect of using crop rotations in salt-affected soils to combat soil deterioration under current climate and climate change. The selected crops for these rotations were either salinity tolerant or tolerant cultivars from sensitive or medium-tolerant crops. Implementing precise land leveling and cultivation on raised beds, in addition to intercropping and cultivation of legume crop in between winter and summer crops, contributed in saving some of the applied irrigation water to these rotations.

I appreciate all the collaboration I got from all the co-authors, where we spent about 12 months to put this book in its final format. I hope this book will help researchers and policy makers in their future thinking and be a base for more research and knowledge.

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