

Preface	ix
Editors.....	xi
Contributors	xiii

Section I Crop Responses and Microbe-Mediated Stress Management: Legumes

1. Simulation of the Daily Exchange of Carbon and Nitrogen between Microorganisms, Plant and Symbionts of Intercropped Legume with Cereal in Mediterranean Agro Ecosystem.....	3
<i>Mourad Latati</i>	
2. Biotic and Abiotic Stress Responses of Domesticated Vigna Legumes: A Comprehensive Review	11
<i>Difo Voukang Harouna</i>	
3. Ecosystem Services of the Crop Wild Relatives, in Particular, Food Legume Landraces- <i>Rhizobia</i> Association in Northern Africa and the Adaptation of Their Genetic Material to Agronomic and Environmental Objectives.....	25
<i>Siheem Tellah, Wahiba Amri-Tiliouine, Fahima Nabi, Agostino Sorgona, and Maurizio Badiani</i>	
4. Role of Leguminous Microbiome in Plant Growth Promotion and Plant Protection.....	39
<i>Pritesh Patel</i>	
5. Plant Growth-Promoting Bacteria Modulate Biotic and Abiotic Stress Tolerance in Legumes	51
<i>Muhammad Arslan Ashraf, Rizwan Rasheed, Muhammad Iqbal, Iqbal Hussain, Abida Parveen, and Ali Akbar</i>	
6. Symbiosis with Fungal Endophytes Conferring Stress Tolerance in Legumes	69
<i>Chaitanya Ghalagi, D. J. Bagyaraj, and B. Mohan Raju</i>	
7. Multi-trait <i>Trichoderma</i> for Improving Plant Health of Grain Legumes	85
<i>Sandeep Kumar, Sonika Pandey, Utkarsh Singh Rathore, and Krishna Kumar</i>	
8. Effects of Pesticides and Heavy Metals on the Growth and Yield of Food Legume Plants	103
<i>A. Sankaranarayanan, N. Amaresan, and Abhishek Sharma</i>	

Section II Crop Responses to Stress-Soybean

- 9. Biotic and Abiotic Stress Responses of Hyacinth Bean (*Lablab purpureus*) and Soybean (*Glycine max*): A Mini-review** 115
Difo Voukang Harouna and Elmugheira M. Ibrahim Mohammed

Section III Crop Responses and Microbe-Mediated Stress Management: Groundnut

- 10. Biological Control of Soilborne Diseases and Water Stress Management in Groundnut** 123
Dhruti Amin, Abhishek Sharma, Sanket Ray, and Siva Satya Mohan Jampala

Section IV Crop Responses to Microbe-Mediated Abiotic Stress Management

- 11. Microbial Mitigation of Abiotic Stress Responses in Legumes** 141
Utkarsh M. Bitla, Akash L. Shinde, Ajay M. Sorty, Kamlesh K. Meena, and Narendra P. Singh
- 12. Microbial Bioinoculants for Salt Stress Tolerance in Plants** 155
Mohammed Shariq Iqbal and Mohammad Israil Ansari
- 13. Microbial Mitigation of Salinity and Water Stress in Legume Crops** 165
Sanket Ray, Dhruti Amin, and Nafisa Patel
- 14. Plant Growth-Promoting Rhizobacteria (PGPR) for the Mitigation of Salt Stress and Growth Promotion of Chickpea** 177
Kusum Sharma and Senthilkumar Murugesan
- 15. Contribution of Arbuscular Mycorrhizal Symbiosis to Salinity Tolerance in Leguminous Plants** 191
Hassan Etesami and Saeid Shafiei
- 16. Microbial-Mediated Abiotic Stress Tolerance in Soybean Plants** 209
Abhishek Bharti, Hemant S. Maheshwari, Mahaveer P. Sharma, and Anil Prakash

Section V Crop Responses to Microbe-Mediated Biotic Stress Management

- 17. Bacterial Biological Control Agents for Soilborne Diseases Management in Pulses: Present Status and Future Prospects** 231
Pranamita Kunda, Abhishek Mukherjee, and Paltu Kumar Dhal
- 18. *Bacillus thuringiensis* Cry Gene Mediated Biological Pest Management in Grain Legumes** 245
Abhishek Sharma, Dhruti Amin, Rajesh Arora, and Ajay Kumar Mathur

19. Structural and Functional Diversity of Cry Genes and Their Utilization in Pest Management of Grain Legumes.....	257
<i>G. K. Sujayanand and Sonika Pandey</i>	
20. Microbial Mitigation of Biotic Stresses in Soybean (<i>Glycine max</i>)	271
<i>E. T. Alori, A. O. Adekiya, A. Joseph, C. O. Aremu, and K. A. Adegbite</i>	
Index.....	279