

Contents

Sanjay Kumar Joshi, Rashmi Upadhyay

Chapter 1

Agrochemical industry: a multibillion industry — 1

Himani, Pringal Upadhyay, Sonu Kumar Mahawer, Ravendra Kumar,
Om Prakash

Chapter 2

Plant protection through agrochemicals and its consequences — 25

Parul Chaudhary, Shivani Singh, Anuj Chaudhary, Upasana Agri,
Geeta Bhandari

Chapter 3

Agrochemicals and their effects on soil microbial population — 45

Nitika Negi, Siya Sharma, Nitika Bansal, Aditi Saini, Ratnaboli Bose,
M. S. Bhandari, Amit Pandey, Shailesh Pandey

Chapter 4

Effect of abiotic stresses on plant systems and their mitigation — 59

Hari Narayan, Pragati Srivasatava, Santosh Chandra Bhatt, Divya Joshi,
Ravindra Soni

Chapter 5

Plant pathogenesis and disease control — 95

Sonu Kumar Mahawer, Sushila Arya, Tanuja Kandpal, Ravendra Kumar,
Om Prakash, Manoj Kumar Chitara, Puspendra Koli

Chapter 6

**Plant defense systems: mechanism of self-protection by plants against
pathogens — 115**

Amir Khan, Mohd Shahid Anwar Ansari, Irsad, Touseef Hussain,
Abrar Ahmad Khan

Chapter 7

Role of beneficial microbes for plant growth improvement — 141

Hemant Sharma, Binu Gogoi, Arun Kumar Rai

Chapter 8

Microbial bioproducts for plant growth and protection: trends and prospective — 177

Sougata Ghosh, Bishwarup Sarkar, Sirikanjana Thongmee

Chapter 9

Nanopesticides: challenges and opportunities — 201

Bahman Fazeli-Nasab, Ramin Piri, Ahmad Farid Rahmani

Chapter 10

Assessment of the role of rhizosphere in soil and its relationship with microorganisms and element absorption — 225

Viphrezolie Sorhie, Pranjal Bharali, Alemtoshi

Chapter 11

Biosurfactant: an environmentally benign biological agent for sustainable agroecological agriculture — 253

Neela Gayathri Ganesan, Subhranshu Samal, Vinoth Kannan,

Senthil Kumar Rathnasamy, Vivek Rangarajan

Chapter 12

***Bacillus* lipopeptide-based antifungal agents for plant disease control — 313**

Pragati Srivasatava

Chapter 13

Use of alkaloids in plant protection — 337

U. M. Aruna Kumara, N. Thiruchchelvan

Chapter 14

Biotechnological approaches for plant stress management — 353

Sikhamoni Bora, Rajib Kumar Borah, Krishna Giri

Chapter 15

Role of proteins and enzymes in plant disease control — 395

Bahman Fazeli-Nasab, Ramin Piri, Yamini Tak, Anahita Pahlavan,
Farzaneh Zamani

Chapter 16

The role of PGPRs in phosphate solubilization and nitrogen fixation in order to promote plant growth parameters under salinity, drought, nutrient deficiency, and heavy metal stresses — 415

Jaagriti Tyagi, Parul Chaudhary, Jyotsana, Upasana Bhagwati,
Geeta Bhandari, Anuj Chaudhary

Chapter 17

Impact of endophytic fungi in biotic stress management — 447

G. K. Dinesh, B. Priyanka, Archana Anokhe, P. T. Ramesh, R. Venkitachalam,
K. S. Keerthana Sri, S. Abinaya, V. Anithaa, R. Soni

Chapter 18

Ecosystem services and ecological role of birds in insect and pest control — 463

G. Venkatesh, P. Sakthi Priya, V. Anithaa, G. K. Dinesh, S. Velmurugan,
S. Abinaya, P. Karthika, P. Sivasakthivelan, R. Soni, A. Thennarasi

Chapter 19

Role of entomopathogenic fungi in biocontrol of insect pests — 505

Debiprasad Dash, Pallabi Mishra

Chapter 20

Indigenous practices for pest control and marketability of the produce for development of sustainable agriculture — 549

Thajudeen Thahira, Kinza Qadeer, Julie Sosso,
Mohamed Cassim Mohamed Zakeel

Chapter 21

Role of plant microbiome in crop protection — 573

List of contributing authors — 601

Index — 611