

Contents

Part I Plant Biotechnology from Inception to the Present

- 1 **Overview of Plant Biotechnology from Its Early Roots to the Present** 3
Ara Kirakosyan, Peter B. Kaufman, and Leland J. Cseke
- 2 **The Use of Plant Cell Biotechnology for the Production of Phytochemicals** 15
Ara Kirakosyan, Leland J. Cseke, and Peter B. Kaufman
- 3 **Molecular Farming of Antibodies in Plants** 35
Rainer Fischer, Stefan Schillberg, and Richard M. Twyman
- 4 **Use of Cyanobacterial Proteins to Engineer New Crops** 65
Matias D. Zurbriggen, Néstor Carrillo, and Mohammad-Reza Hajirezaei
- 5 **Molecular Biology of Secondary Metabolism: Case Study for *Glycyrrhiza* Plants** 89
Hiroaki Hayashi

Part II Applications of Plant Biotechnology in Agriculture and Industry

- 6 **New Developments in Agricultural and Industrial Plant Biotechnology** 107
Ara Kirakosyan, Peter B. Kaufman, and Leland J. Cseke
- 7 **Phytoremediation: The Wave of the Future** 119
Jerry S. Succuro, Steven S. McDonald, and Casey R. Lu
- 8 **Biotechnology of the Rhizosphere** 137
Beatriz Ramos Solano, Jorge Barriuso Maicas, and Javier Gutierrez Mañero

9	Plants as Sources of Energy	163
	Leland J. Cseke, Gopi K. Podila, Ara Kirakosyan, and Peter B. Kaufman	
Part III Use of Plant Secondary Metabolites in Medicine and Nutrition		
10	Interactions of Bioactive Plant Metabolites: Synergism, Antagonism, and Additivity	213
	John Boik, Ara Kirakosyan, Peter B. Kaufman, E. Mitchell Seymour, and Kevin Spelman	
11	The Use of Selected Medicinal Herbs for Chemoprevention and Treatment of Cancer, Parkinson's Disease, Heart Disease, and Depression	231
	Maureen McKenzie, Carl Li, Peter B. Kaufman, E. Mitchell Seymour, and Ara Kirakosyan	
12	Regulating Phytonutrient Levels in Plants – Toward Modification of Plant Metabolism for Human Health	289
	Ilan Levin	
Part IV Risks and Benefits Associated with Plant Biotechnology		
13	Risks and Benefits Associated with Genetically Modified (GM) Plants	333
	Peter B. Kaufman, Soo Chul Chang, and Ara Kirakosyan	
14	Risks Involved in the Use of Herbal Products	347
	Peter B. Kaufman, Maureen McKenzie, and Ara Kirakosyan	
15	Risks Associated with Overcollection of Medicinal Plants in Natural Habitats	363
	Maureen McKenzie, Ara Kirakosyan, and Peter B. Kaufman	
16	The Potential of Biofumigants as Alternatives to Methyl Bromide for the Control of Pest Infestation in Grain and Dry Food Products	389
	Eli Shaaya and Moshe Kostyukovsky	
Index		405