Phytoremediation

Methods and Reviews

Edited by

Neil Willey

Center for Research in Plant Science, University of the West of England, Bristol, UK

Contents

retac	'ev
Contri	butors xiii
ART	I Manipulating Phenotypes and Exploiting Biodiversity
1	Genetic Engineering of Plants for Phytoremediation of Polychlorinated Biphenyls
	Shigenori Sonoki, Satoru Fujihiro, and Shin Hisamatsu3
2	Increasing Plant Tolerance to Metals in the Environment
	Jennifer C. Stearns, Saleh Shah, and Bernard R. Glick15
3	Using Quantitative Trait Loci Analysis to Select Plants for Altered Radionuclide Accumulation
	Katharine A. Payne, Helen C. Bowen, John P. Hammond, Corrina R. Hampton, Philip J. White, and Martin R. Broadley 27
4	Detoxification of Soil Phenolic Pollutants by Plant Secretory Enzyme
	Guo-Dong Wang and Xiao-Ya Chen49
5	Using Real-Time Polymerase Chain Reaction to Quantify Gene Expression in Plants Exposed to Radioactivity
	Yu-Jin Heinekamp and Neil Willey59
6	Plant Phylogeny and the Remediation of Persistent Organic Pollutants
•	Jason C. White and Barbara A. Zeeb71
7	Producing Mycorrhizal Inoculum for Phytoremediation Abdul G. Khan89
8	Implementing Phytoremediation of Petroleum Hydrocarbons Chris D. Collins
9	Uptake, Assimilation, and Novel Metabolism of Nitrogen Dioxide in Plants
	Misa Takahashi, Toshiyuki Matsubara, Atsushi Sakamoto, and Hiromichi Morikawa109
Part	II MANIPULATING CONTAMINANT AVAILABILITY AND DEVELOPING RESEARCH TOOLS
10	Testing the Manipulation of Soil Availability of Metals Fernando Madrid Diaz and M. B. Kirkham

11	of Radionuclides
	Nicholas R. Watt131
12	Using Electrodics to Aid Mobilization of Lead in Soil
	David J. Butcher and Jae-Min Lim139
13	Stable Isotope Methods for Estimating the Labile Metal Content of Soils
	Andrew J. Midwood ······ 149
14	In Vitro Hairy Root Cultures as a Tool for Phytoremediation Research
	Cecilia G. Flocco and Ana M. Giulietti161
15	Sectored Planters for Phytoremediation Studies
	Chung-Shih Tang
16	Phytoremediation With Living Aquatic Plants: Development and Modeling of Experimental Observations
	Steven P. K. Sternberg185
17	Near-Infrared Reflectance Spectroscopy: Methodology and Potential for Predicting Trace Elements in Plants
	Rafael Font, Mercedes del Río-Celestino, and Antonio de Haro-Bailón205
PART	III CURRENT RESEARCH TOPICS IN PHYTOREMEDIATION
18	Using Hydroponic Bioreactors to Assess Phytoremediation Potential of Perchlorate
	Valentine Nzengung221
19	Using Plant Phylogeny to Predict Detoxification of Triazine Herbicides
	Sylvie Marcacci and Jean-Paul Schwitzguébel 233
20	Exploiting Plant Metabolism for the Phytoremediation of Organic Xenobiotics
	Peter Schröder251
21	Searching for Genes Involved in Metal Tolerance, Uptake, and Transport
	Viivi H. Hassinen, Arja I. Tervahauta, and Sirpa O. Kärenlampi265
22	Manipulating Soil Metal Availability Using EDTA and Low-Molecular-Weight Organic Acids
	Longhua Wu, Yongming Luo, and Jing Song291

23	Soils Contaminated With Radionuclides: Some Insights for Phytoextraction of Inorganic Contaminants Neil Willey	205
24	Assessing Plants for Phytoremediation of Arsenic-Contaminated Soils Nandita Singh and Lena Q. Ma	
Part	IV CONTEXTS AND UTILIZATION OF PHYTOREMEDIATION	
25	Phytoremediation in China: Inorganics Shirong Tang	· 351
26	Phytoremediation in China: Organics Shirong Tang and Cehui Mo	· 381
27	Chen Tong-Bin, Liao Xiao-Yong, Huang Ze-Chun, Lei Mei, Li Wen-Xue, Mo Liang-Yu, An Zhi-Zhuang, Wei Chao-Yang,	• 39 3
28	Phytoremediation in Portugal: Present and Future Cristina Nabais, Susana C. Gonçalves, and Helena Freitas	· 405
29	Phytoremediation in Russia Yelena V. Lyubun and Dmitry N. Tychinin	· 42 3
30	Phytoremediation in India M. N. V. Prasad ·······	· 435
31	Phytoremediation in New Zealand and Australia Brett Robinson and Chris Anderson	· 455
Inda:		