Bioremediation And Biodegradation Of Pesticide From

Bioremediation of pesticide in soil and water is today's urgent need. By biological method it found more safer than other physical and chemical methods. Endosulfan and monocrotophos are the most popular and cheap pesticides. Now monocrotophos is partially or fully banned in many countries. Endosulfan is also now banned in many countries. But in some countries these pesticides are still in use the residues and byproducts of these pesticides are countiued the serious attention. This an attempt to develop the biodegradation technology of these pesticies.

This 4-volume set focuses on the use of microbial bioremediation and phytoremediation to clean up pollutants in soil, such as pesticides, petroleum hydrocarbons, metals, and chlorinated solvents, which reduce the soil's fertility and renders it unfit for plant growth. The volumes cover the many diverse eco-friendly microbial bioremediation and phytoremediation techniques for sustainable soil management. Volume 4: Degradation of Pesticides and Polychlorinated Biphenyls addresses pesticide degradation, PCBs degradation, and genetic interventions. It begins by describing environmental pesticide degradation, mechanisms and sustainability, microbes and microbial enzymes, plant microbe interactions, organophosphorus degradations and endosulfan degradation. It then goes on to discuss PCBs and degradation, cypermethrin, degradation by Phanerochaete chrysosporium, and carvone and surfactants for degradation of PCBs. The book also advocates for

genetic systems for degradation of PCBs and pesticides, with discussion of the different advantages and disadvantages for each strategy and the various techniques. Other volumes in the 4-volume set: • Volume 1: Fundamental Aspects and Contaminated Sites • Volume 2: Microbial Approaches and Recent Trends • Volume 3: Inventive Techniques, Research Methods, and Case Studies Together, these four volumes provide in-depth coverage of the mechanisms, advantages, and disadvantages of the bioremediation and phytoremediation technologies for safe and sustainable soil management.

Pollution represents a major global concern in aquaculture because of the growing demand for aquatic products and animal protein in both advanced and developed countries. Sources of aquatic pollution are enumerated, pesticides are the most dangerous since they are hydrophobic, persistence, and accumulated inside different animal tissues. Using some traditional; physical and chemical technologies to remediate the water is very expensive and represent hazards on the surrounding life fauna so, the developing of an alternative biological strategy is very important. Bioremediation is the using of living organisms to remove or detoxify pollutants. It can be applied in-situ or ex-situ through many strategies; bioattenuation, biostimulation or bioaugmentation. Free-enzyme based products and genetically engineered microorganisms are new promising technologies of bioremediation. Many factors can affect the bioremediation process. Bio-remediators; bacteria, fungi, algae and plants were found to have a vital role in pesticides biodegradation. In spite of its restricted disadvantages, bioremediation is an eco-friendly, cheap and effective strategy to complete mineralization of pesticides.

Taking into consideration that the agricultural industry is greatly dependent on pesticide chemicals to deal with the damage caused due to pests, this new volume details the challenges along with the bioremediation and remediation measures, such as the use of beneficial microorganisms, polymeric nanocomposites for nanoremediation, phytoremediation, and more. It looks at pesticide contamination from agricultural activities in a variety of different environs and a selection of sustainable and eco-friendly remediation approaches. It provides a spectrum of concepts, ideas, and knowledge related to the detrimental actions of pesticides on the environment directly and on human beings indirectly and provides insight into sustainable and advanced pesticide remediation technology. It fills a gap in the available literature in this field and will provide valuable for academicians, researchers, agriculturists, and students.

Biodegradation, Pollutants and Bioremediation Principles

Biodegradation

Microbe-Induced Degradation of Pesticides

Use of Landfarming to Remediate Soil Contaminated by Pesticide Waste

Pesticides

Effects of Biosurfactants on Remediation of Soils Contaminated with Pesticides

As industry develops globally, environmental pollution grows to be an increasingly serious problem with each passing year. While there are many things that individuals on every level of power can do to mitigate the harm done to the environment, environmental remediation is a step to take to save our soil and

water resources. As this problem is ongoing, it is essential to be knowledgeable in the emerging techniques made within the field of environmental remediation. The Research Anthology on Emerging Techniques in Environmental Remediation is a comprehensive resource on the emerging techniques and developments made within the field of environmental remediation. With global contributing authors, this book explores environmental remediation within diverse settings and international standards. Covering topics such as pollution and contamination, nanotechnology, and agriculture, this book is an essential reference for scientists, chemists, environmentalists, government officials, professors, students, researchers, conservationists, and academicians.

In this volume, experts from universities, government labs and industry share their findings on the microbiological, biochemical and molecular aspects of biodegradation and bioremediation. The text covers numerous topics, including: bioavailability, biodegradation of various pollutants, microbial community dynamics, properties and engineering of important biocatalysts, and methods for monitoring bioremediation processes. Microbial processes are environmentally compatible and can be integrated with non-biological processes to detoxify, degrade and immobilize environmental contaminants.

Growing population in the world demands increase in the food production and intense health care systems. Use of chemical pesticides is imperative for the management insects in agricultural and disease transmission, weeds and harmful microbes. Monitoring and estimating pesticide residue in crop plants, food, soil,

water and other ecosystem has become significant in the recent concern on environment and ecosystem. The book comprises of new innovative trends to detect pesticide residue in crop plants, animal origin food and fishes. Different advanced extraction techniques of sample preparation for residue analysis are elaborately described. Apart from residue assays, metabolism and degradation of pesticide compounds fenamophos, chlorpyrifos, pirimiphos, heptachlor and organic pesticides are also documented. This book volume is of twelve chapters contributed by eminent scientists from eleven countries.

When first developed, chlorinated pesticides such as DDT, dieldrin, and mirex were received with open arms, quickly becoming popular as effective, economic agents against pests. But evidence began to mount that residues of these chemicals remained in the environment, not breaking down, often appearing in plants and animals. By the late seventies many pesticides had achieved a terrible notoriety and were subsequently banned in a number of countries. Of tremendous concern, then, is the persistence of pesticides in the environment. The major thrust of research and development in the area of pesticides has properly been the creation of substances that are both effective and degradable. Yet in order to successfully promote the use of biodegradable pesticides, one must fully understand the mechanism of degradation, and it is to this vital subject that we address ourselves in the present volume. According to the Biodegradation Task Force, Safety of Chemicals Com mittee, Brussels (1978), biodegradation may be defined as the molecular degradation of an organic substance resulting from the

complex action of living organisms. A substance is said to be biodegraded to an environmentally acceptable extent when environmentally undesirable properties are lost. Loss of some characteristic function or property of substance by biodegradation may be referred to as biological transformation.

Biodegradation and Bioremediation

Pesticides in Soils

Microbial Metabolism of Xenobiotic Compounds

Twenty Years of Research and Development on Soil Pollution and Remediation in China

Research Anthology on Emerging Techniques in Environmental Remediation

Pesticide Remediation in Soils and Water

Xenobiotic compounds including pesticides, nitrophenols, pyridine, polycyclic aromatic compounds and polychlorinated biphenyls are widely spread in environment due to anthropogenic activities. Most of them are highly toxic to living beings due to their mutagenic and carcinogenic properties. Therefore, the removal of these compounds from environment is an essential step for environmental sustainability. Microbial remediation has emerged as an effective technology for degradation of these xenobiotic compounds as microorganisms have unique ability to utilize these compounds as their sole source of carbon and

energy. The primary goal of this book is to provide detailed information of microbial degradation of many xenobiotic compounds in various microorganisms.

Bioremediation technologies are gaining immense credibility in the field of waste management because of their eco-compatibility nature. Biomass can interact and confront with water and soil pollutants in both active (live) as well as passive (dead) way, thereby offering numerous opportunities of exploring them for environmental clean-up. In 21st century, wastes are no longer a waste but are recognized as a valuable Resource. Employing novel and integrated strategies for the development of modern bioremediation processes is desperate need of the hour. This edited book on Applied Bioremediation - Active and Passive Approaches contains mix of interesting chapters that will certainly add to the advancement of knowledge and will provide the required valuable resource and stimulus to the researchers worldwide.

This book reviews the occurrence and fate of pesticides in soils, their impact on soil quality and soil ecosystems, and it also provides a comprehensive overview of the latest prevention

and remediation strategies of soil contamination. Chapters from expert contributors cover topics such as soil pollution monitoring, the role of dissolved organic matter on the environmental fate of pesticides in soils, the effects of pesticides on soil microbial communities, plant uptake of pesticides from soils, and nano-based pesticides. Particular attention is given to the latest physicochemical and biological technologies developed to immobilize or degrade pesticides, preventing soil and water pollution. Given its scope, the book will appeal to researchers, professionals, including environmental chemists, engineers, ecologists, and policy-makers responsible for soil management.

Life on the planet depends on microbial activity. The recycling of carbon, nitrogen, sulphur, oxygen, phosphate and all the other elements that constitute living matter are continuously in flux: microorganisms participate in key steps in these processes and without them life would cease within a few short years. The comparatively recent advent of man-made chemicals has now challenged the environment: where degradation does not occur, accumulation must perforce take place. Surprisingly though, even

the most recalcitrant of molecules are gradually broken down and very few materials are truly impervious to microbial attack. Microorganisms, by their rapid growth rates, have the most rapid turn-over of their DNA of all living cells. Consequently they can evolve altered genes and therefore produce novel enzymes for handling "foreign" compounds - the xenobiotics - in a manner not seen with such effect in other organisms. Evolution, with the production of micro-organisms able to degrade molecules hitherto intractable to breakdown, is therefore a continuing event. Now, through the agency of genetic manipulation, it is possible to accelerate this process of natural evolution in a very directed manner. The time-scale before a new microorganism emerges that can utilize a recalcitrant molecule has now been considerably shortened by the application of well-understood genetic principles into microbiology. However, before these principles can be successfully used, it is essential that we understand the mechanism by which molecules are degraded, otherwise we shall not know where best to direct these efforts.

Sources, Health Risks, and Remediation

Life of Science

Biodegradation of Pesticides
The Construction and Assessment Oof a Biological System for Biodegradation and Recycling of Pesticide Wastes
Environmental Biotechnology
Soil Bioremediation

This book focuses on the toxicity of various organic and inorganic pollutants, their eco-toxicological effects and eco-friendly approaches for remediation of environmental pollutants. Extensive focus has been relied on the recent advances in ecofriendly approaches such as bioremediation and phytoremediation technologies, including the use of various group of microbes for remediation of environmental pollutants, etc. Researchers working in the field of bioremediation, phytoremediation, waste management and related fields will find this compilation most useful for further study to learn about the subject matter.

Increased awareness surrounding environmental protection has prompted the development of more ecofriendly technologies. This book provides useful information on technologies based upon the use of biological agents for environmental clean-up, including bacteria, yeast, fungi, algae, and plants. Some chapters refer to the direct application of products derived from plants and microorganisms for designing strategies of environmental remediation. The combination of strategies

helps in efficient removal of pollutants generated from anthropogenic activities with minimal environmental impact. This book is meant for professionals involved in environmental technology and waste management.

Addresses a Global Challenge to Sustainable Development Advances in Biodegradation and Bioremediation of Industrial Waste examines and compiles the latest information on the industrial waste biodegradation process and provides a comprehensive review. Dedicated to reducing pollutants generated by agriculturally contaminated soil, and plastic waste from various industries, this text is a book that begs the question: Is a pollution-free environment possible? The book combines with current available data with the expert knowledge of specialists from around the world to evaluate various aspects of environmental microbiology and biotechnology. It emphasizes the role of different bioreactors for the treatment of complex industrial waste and provides specific chapters on bioreactors and membrane process integrated with biodegradation process. It also places special emphasis on phytoremediation and the role of wetland plant rhizosphere bacterial ecology and the bioremediation of complex industrial wastewater. The authors address the microbiological, biochemical, and molecular aspects of biodegradation and bioremediation which cover numerous topics, including microbial genomics and proteomics for the bioremediation of industrial waste. This text contains

14 chapters and covers: Bioprocess engineering and mathematical modelling with a focus on environmental engineering The roles of siderophores and the rhizosphere bacterial community for phytoremediation of heavy metals Current advances in phytoremediation, especially as it relates to the mechanism of phytoremediation of soil polluted with heavy metals Microbial degradation of aromatic compounds and pesticides: Challenges and solution Bioremediation of hydrocarbon contaminated wastewater of refinery plants The role of biosurfactants for bioremediation and biodegradation of various pollutants discharged from industrial waste as they are tools of biotechnology The role of potential microbial enzymatic processes for bioremediation of industrial waste The latest knowledge regarding the biodegradation of tannery and textile waste A resource for students interested in the field of environment, microbiology, industrial engineering, biotechnology, botany, and agricultural sciences, Advances in Biodegradation and Bioremediation of Industrial Waste provides recent knowledge and approaches on the bioremediation of complex industrial waste.

Provides a timely and comprehensive review of all methods of remediation of land and water contaminated by pesticides with contributions from experts in industry, government and academia. The safe disposal of pesticide wastes is one of the most critical issues in the whole field of pesticide technology and this book covers all the main

methods for reducing the concentration of pesticide waste, including incineration and destruction by micro-organisms (bioremediation). It discusses new remediation methods, pesticide production and generation of pesticide waste, focusing on the prevention of spills and accidental contamination. There is also a chapter on regulation authored by two members of the US Environment Agency. This is a first class book of interest to anyone involved in the production, use and clean-up of pesticides.

Strategies for Bioremediation of Organic and Inorganic Pollutants

Pesticides Bioremediation

Bioremediation and Phytoremediation Technologies in Sustainable Soil Management

Applied Bioremediation and Phytoremediation

Bioremediation in Latin America

Biochemistry of microbial degradation

With increasing government regulation of pollution, as well as willingness to levy punitive fines for transgressions, treatment of industrial waste is a important subject. This book is a single source of information on treatment procedures using biochemical means for all types of solid, liquid and gaseous contaminants generated by various chemical and allied industries. This book is intended for practicing environmental engineers and technologists from any industry as well as researchers and professors. The topics covered include the treatment of gaseous,

liquid and solid waste from a large number of chemical and allied industries that include dye stuff, chemical, alcohol, food processing, pesticide, pharmaceuticals, paint etc. Information on aerobic and anaerobic reactors and modeling and simulation of waste treatment systems are also discussed. * Compares chemical and biochemical means of industrial waste treatment * Provides details of technology (i.e. reactors, operating conditions etc) with regard to the biochemistry aspects. * Can be used as a teaching aid for graduate courses and a reference material by practicing environmental scientists and engineers. * Researchers can extract synergy between treatment procedures and various effluents.

This book focuses on the microbial degradation of endosulfan, lindane, chlorophenols, organochlorine, aldrin, dieldrin, isoproturon and atrazine, etc. which are commonly used in crop fields to kill the pests. Further, it illustrates the role of degradative enzymes, metabolic pathways of degradation, toxicity of metabolites, and the factors regulating the pesticide degradation. In view of persistence of synthetic pesticides, scientists have discovered suitable microbes, such as bacteria, fungi and algae (naturally occurring or genetically engineered) over the years. After successful trials under laboratory and field conditions, these microbes are being used to degrade chemical pesticides in agriculture. As of now 2.56 billion kg of chemical pesticides is used every year to protect agricultural fields against pest attack. These technologies have been found to be highly effective, eco-friendly and cost-effective without disturbing the agro-ecosystems. As this book contains review articles contributed by various researchers from different countries

whose work demonstrates recent advances in microbial degradation of pesticides, it will serve as a ready reckoner and also a valuable quick reference guide for scientists, academicians, cultivators and industrialists alike.

This 4-volume set focuses on the use of microbial bioremediation and phytoremediation to clean up pollutants in soil, such as pesticides, petroleum hydrocarbons, metals, and chlorinated solvents, which reduce the soil's fertility and renders it unfit for plant growth. Volume 1: Fundamental Aspects and Contaminated Sites begins with an overview of phytoremediation and the role of environmental factors. It goes on to introduce soil assessment techniques and offers methods of remediation designed to combat soil and agricultural degradation. It discusses soils contaminated by heavy metals; microbial and phytoremediation-based removal of polycyclic aromatic hydrocarbons (PAHs) from coal, crude oil, and gasoline; microbial bioremediation and amelioration of pesticide-contaminated soils; phytoremediation techniques for biomedical waste contaminated sites; as well as biomediation processes for human waste sites. Biopesticides are also explained as an alternative to conventional pesticides. Other volumes in the 4-volume set: □ Volume 2: Microbial Approaches and Recent Trends □ Volume 3: Inventive Techniques, Research Methods, and Case Studies □ Volume 4: Degradation of Pesticides and Polychlorinated Biphenyls Together, these four volumes provide in-depth coverage of the mechanisms, advantages, and disadvantages of the bioremediation and phytoremediation technologies for safe and sustainable soil management.

The objective of this study was to examine the potential for degradation of mixtures of pesticides (chlorpyrifos, linuron, metribuzin) by a range of bacteria and fungi and to relate this capability to enzyme production and quantify the rates of degradation of the components of the mixture of xenobiotic compounds. Overall, although bacteria (19 Bacillus and 4 Pseudomonas species) exhibited tolerance to the individual and micture of pesticides actual degradation was not evident. Five species of white rot fungi were grown on minimal salts agar plates amended with 0, 10 and 30 mg L−1 of chlorpyrifos, linuron and metribuzin, individually and as a mixture with a total concentration 15 and 30 mg L−1. Four of these, T. versicolor, P. gigatea, P. coccineus and P. ostreatus, exhibited very good tolerance to the pesticides. They were also grown on a nutritionally poor soil extract agar amended with a mixture of the pesticides at different concentrations (0-70 mg L−1). Subsequently, the ability of T. versicolor, P. gigatea, P. coccineus to degrade lignin and production of laccase in the presence of mixture of the pesticides was examined as well as their capacity to degrade the pesticide mixture at different concentrations (0-50 mg L−1) in soil extract broth was quantified using HPLC. This showed that only T. versicolor had the ability to degrade linuron, after three weeks incubation although all tested species produced laccase. Subsequently, the temporal degradation rates of T. versicolor was examined in relation to temporal degradation of a mixture of the pesticides chlorpyrifos, linuron and metribuzin with total concentrations 0-50 mg L−1 and the temporal laccase production was quantified over a six week period in relation to ionic and non-ionic water potential

stress (-2.8 MPa). These studies showed that the test isolate had the ability to produce very high levels of laccase at -2.8 MPa water potential adjusted non-ionically by using glycerol and quite lower levels in soil extract broth without stress while T. versicolor did not produce laccase at -2.8 MPa when the medium was modified ionically. Finally, T. versicolor was able to degrade the pesticide linuron in all tested water regimes, after five weeks incubation, regardless of the concentration of the mixture. In contrast, about 50% of the metribuzin was degraded, only at -2.8 MPa water potential adjusted non-ionically with glycerol. Chlorpyrifos and its main metabolite TCP were not detected, possibly, due to a combination of hydrolysis, photolysis and volatilization degradation. The capacity of T. versicolor to degrade linuron in mixtures of pesticides and the production of high levels of laccase, in a nutritionally poor soil extract broth, even under water stress suggests potential application of this fungus in bioremediation.

Biological Approaches to Controlling Pollutants

Occurrence, Fate, Control and Remediation

Active and Passive Approaches

Current Research and Perspectives

Bio-remediation to Overcome Pesticide Pollution in Aquaculture

Recent Trends in Pesticide Residue Assay

Biodegradation and BioremediationSpringer Science & Business Media

The book compiles an update information about the state of bioremediation in emerging Latin American countries. Some of the studied regions are sites that suffered decades of pollution by

agrochemicals, heavy metals and industrial waste due to the lack of control by government regulations. Such is the case of Northern Argentina, where were illegally deposited over 30 tn of obsolete organochlorine pesticides in 1994. The content has focused in the use of native organisms (from bacteria to plants) as a viable solution to the problem of pollution, using low-cost and powerful techniques, socially well accepted and appropriate from the environmental point of view. In this context, levels of pesticide found in the Latin American population are informed. It was also displayed as a multidisciplinary approach based on concerns of a diverse group of researchers (biochemists, biologists, chemical engineers and geneticists) about a global problem, dealing with specific cases of study, with a view to project their findings to worldwide. In this regard, researchers provide their findings to regulatory sectors, whom could make appropriate decisions.

An authoritative account of the application of fungi to the treatment of environmental pollution.

With focus on the practical use of modern biotechnology for environmental sustainability, this book provides a thoughtful overview of molecular aspects of environmental studies to create a new awareness of fundamental biological processes and sustainable ecological concerns. It covers the latest research by prominent scientists in modern biology and delineates recent and prospective applications in the sub-areas of environmental biotechnology with special focus on the biodegradation of toxic pollutants, bioremediation of contaminated environments, and bioconversion of organic wastes toward a green economy and sustainable future.

Advances in Biodegradation and Bioremediation of Industrial Waste

Fungi in Bioremediation
Recent Advances in Environmental Management

Biodegradation, Bioremediation, and Bioconversion of Xenobiotics for Sustainable Development
Pesticides in Soil and Water

The quality of agricultural soils are always under threat from chemical contaminants, which ultimately affect the productivity and safety of crops. Besides agrochemicals, a new generation of substances invades the soil through irrigation with reclaimed wastewater and pollutants of organic origin such as sewage sludge or cattle manure. Emerging pollutants such as pharmaceuticals, nanomaterials and microplastics are now present in agricultural soils, but the understanding of their impact on soil quality is still limited. With focus on in situ bioremediation, this book provides an exhaustive analysis of the current biological methodologies for recovering polluted agricultural soils as well as monitoring the effectiveness of bioremediation.

Pesticides have played a significant role in increasing food production, and in view of growing worldwide food demand. Nevertheless; some of them have been classified as persistent toxic chemicals. This has resulted in serious concern about environmental contamination. Once a pesticide or toxic chemical find its way in the environment, a major part of it comes in contact with soil. There are several possible sources of pesticide contamination; at manufacturing, storage, or user sites. The most serious examples of pesticide contamination are typically the result of poor production and waste management practices of pesticide manufacturing, formulation, and application facilities. Improper

storage, handling, and also have resulted in pesticide contamination at these sites and at landfills. Today, many remediation technologies are used to remove the pesticides from the soil. One of the soil treatment methods is enhanced biodegradation. Bioremediation of the soil has often proven to be a cheap solution for contaminated soil problem. This research was conducted to investigate the effectiveness of biologically produced surfactants (biosurfactants) on the biodegradation of pesticide-contaminated soil and evaluate the potential for biosurfactant-enhanced bioavailability of pesticide in soil. In order to determine the effectiveness of biosurfactants on pesticides, sophorolipid and rhamnolipid type biosurfactants were used. These biosurfactants were chosen since they are well characterized and their stimulating effect on the biodegradation of hydrophobic substrates was described in the literature. In this study, endosulfan and trifluralin were selected as pesticides. The study was performed in two stages in laboratory conditions. In the first part of the experiment, degradation of endosulfan-contaminated soil was studied by the presence of sophorolipid and in the second part of the experiment; rhamnolipid (JBR 425) was used on the removal of trifluralin-contaminated soil. Throughout the experiment, three different concentrations of sophorolipid and rhamnolipid were applied to soil which, are 0.98, 9.75 and 195 ppm for sophorolipid and 1.6, 100 and 1000 ppm for rhamnolipid. The effectiveness of synthetic or microbial surfactants on biodegradation of chemicals has been investigated by many researchers. However, studies about the biosurfactant enhanced soil remediation for the pesticide contaminants are limited. Besides that, the outcome of surfactant applications has been highly system-specific, conflicting results reported in the literature. Therefore, despite the general trends outlined in literature, the effect of biosurfactants on the biodegradation of organic compounds is poorly understood. Opposed effects are frequently observed. This study is the first M.Sc. thesis study about the use of biosurfactant enhanced bioremediation of

pesticides in Turkey. The results from first part of our study obtained from sophorolipid, were not satisfactory since the degradation patterns for endosulfan were not affected by the presence of sophorolipid. According to the second experiment results, removal of trifluralin ranged from 24-35 %, with the increase in rhamnolipid concentrations. Addition of rhamnolipid (JBR 425) into the soil was found to increase the degradation rate of trifluralin by 13 % as compared to the control soil column. Additional time would probably increase the rate of degradation and bioavailability, as a result of providing the adaptation of microorganisms in contaminated soil media and formation of more bioavailable metabolites.

This volume offers the latest theory, procedures, techniques and applications pertaining to the bioremediation of pesticides, as well as current case studies. The book is composed of chapters written by global experts and is divided into three topical sections. Section A deals with concepts and mechanisms of pesticides bioremediation; Section B examines latest tools and techniques; Section C offers global case studies of pesticides bioremediation. The novel methods described here are timely, as traditional pesticide usage leads to high wastage via decay, vaporization and seepage. This of course leads to environmental contamination and has necessitated the development and use of novel technologies like bioremediation for minimizing the impact of pesticides on the environment. This volume will be of relevance to academics, researchers and students who are working in the realm of pesticide bioremediation, and will enable policy makers and managerial experts across the globe in drafting policies and strategies for the management and treatment of pesticides.

This book contains a collection of different biodegradation research activities where biological processes take place. The book has two main sections: A) Polymers and Surfactants Biodegradation and B) Biodegradation: Microbial Behaviour.

Volume 4: Degradation of Pesticides and Polychlorinated Biphenyls
Bioremediation of Pesticide Contamination.
Microbial Degradation of Pesticides
Biotreatment of Industrial Effluents
Bioremediation of Agricultural Soils
Microbial Biodegradation and Bioremediation

This book is a compilation of detailed and latest knowledge on the various types of environmental pollutants released from various natural as well as anthropogenic sources, their toxicological effects in environments, humans, animals and plants as well as various bioremediation approaches for their safe disposal into the environments. In this book, an extensive focus has been made on the various types of environmental pollutants discharged from various sources, their toxicological effects in environments, humans, animals and plants as well as their biodegradation and bioremediation approaches for environmental cleanup.

This book reviews the progresses and achievements made in the past 20 years of research on soil pollution and remediation in China, and presents 50 review and research articles from all over China, including Hong Kong and Taiwan. The authors include scientists, engineers, entrepreneurs and managers from 26 universities, 18 institutes, 4 leading enterprises and 2 government environmental protection departments. The contents cover fundamental research on soil pollution and remediation, technical development, project demonstration, policy and governance. The polluted soil/site types include farmland, industrial sites, mining areas and oilfields, with heavy metals (cadmium, arsenic, copper, chromium, mercury, lead, zinc, nickel, etc.), organic pollutants (PAHs, PCBs, organochlorine pesticides, phthalate esters, halogenated hydrocarbons, etc.), and metal–organic mixed pollutants. The

remediation techniques mainly include physical and chemical remediation (thermal desorption, soil vapor extraction, in situ advanced chemical oxidation, solidification and stabilization), phytoremediation (phytostabilization, phytoextraction by hyperaccumulators, phyto-prevention by low accumulation plants), bioremediation (microbial adsorption and immobilization, microbial degradation, microbe-enhanced phytoremediation), and combined remediation merging multiple technologies. The governance and policy section mainly explores laws and regulations, criteria and standards, financial guarantees and the industrial market for soil environment and pollution prevention.

Synergistic Approaches for Bioremediation of Environmental Pollutants: Recent Advances and Challenges focuses on the exploitation of various biological treatment technologies and their use to treat toxic contaminants present in industrial effluent and in restoring contaminated sites, which lacks in a more comprehensive manner in existing titles on similar topics available on the global market. The book comprises advanced biotechnologies and updated information, along with sustainable waste management developments and future directions for researchers and scientists working in the field of microbiology. Provides wide information to readers on the state-of-the-art in the application of biochar, microbes, and their synergistic use for wastewater/industrial effluent treatment and environment protection Summarizes current knowledge on the use of biochar and microbes, even dead biomass, for dye decolorization, degradation and removal of heavy metals which may play a key role in achieving a more productive and sustainable environment Explores different aspects of biological methods for contaminants removal for better insights into basic and advanced biotechnological applications Includes supplemented tables and figures

Pesticide-clay water interactions; Pesticide-organic matter interactions; Movement of pesticides in soil; Movement of pesticides in surface water; Volatilization of pesticides; Nonbiological degradation of

pesticides; Degradation of pesticides by soil microorganisms; Persistence of pesticides in soil; Effects of soil on the biological activity of pesticides; Plant uptake of insecticides, fungicides, and fumigants from soils; Efects of pesticides on microorganisms in soil and water; Effects of pesticides on nontarget invertebrates in freshwater and soil; Prevention and detoxification of pesticide residues in soils; Removal of organic pesticides from water to improve quality; Extraction and analytical techniques for pesticides in soil, sediment, and water.

Biodegradation of Mixtures of Pesticides by Bacteria and White Rot Fungi

An Approach Towards Sustainable Technology

Volume 1: Fundamental Aspects and Contaminated Sites

Pesticides in the Natural Environment

Environmental Pollutants and their Bioremediation Approaches

Synergistic Approaches for Bioremediation of Environmental Pollutants: Recent Advances and Challenges

The extensive use of pesticides, their disposal and consequent presence in various environments are of great concern regarding their ecotoxicological effect on the organisms of different trophic levels. Such widespread use results in an increased concentration of these compounds in water, sediments and soils. Chemical pesticides undergo many different pathways once they enter the environment, including transformation/degradation, sorption-desorption, volatilization, uptake by

plants, runoff into surface waters and transport into groundwater. Transformation or degradation is one of the key processes that governs the environmental fate and transport of chemical pesticides, which also comprises different processes including abiotic degradation and biodegradation. During these processes, chemical pesticides are transformed into the degradation products or are completely mineralized to a carbon field. Although abiotic degradation plays a role in many cases, the biodegradation of chemical pesticides by microorganisms is usually the most important and dominant process.

Biological Approaches to Controlling Pollutants, the latest release in the Advances in Pollution Research series, is a comprehensive guide on the most up-to-date biological methods for remediation of pollutants across a variety of industries, with consideration for the advantages, disadvantages and applications of each method. Considering the increasing levels of pollution and contaminated sites worldwide from high population growths and industrial expansion, the most recent advances in biological remediation techniques is an important field of study and one in which researchers need the most cutting-edge methodologies. This book is a necessary read for environmental scientists, along with

postgraduates, academics and researchers working in the area of environmental pollution. It will also be of interest to environmental engineers and any other practitioners who need to evaluate the latest advances in biotechnological control of pollutants. Presents the most cutting-edge advances in a variety of fields relevant to the use of biotechnology and biological techniques in pollutant control Provides in-depth information and methodologies for applying bioremediation to a variety of pollutants Written by a worldwide team of authors to provide a global perspective on the advances in bioremediation

Microbial Biodegradation and Bioremediation brings together experts in relevant fields to describe the successful application of microbes and their derivatives for bioremediation of potentially toxic and relatively novel compounds. This single-source reference encompasses all categories of pollutants and their applications in a convenient, comprehensive package. Our natural biodiversity and environment is in danger due to the release of continuously emerging potential pollutants by anthropogenic activities. Though many attempts have been made to eradicate and remediate these noxious elements, every day thousands of xenobiotics of relatively new entities emerge, thus worsening the

situation. Primitive microorganisms are highly adaptable to toxic environments, and can reduce the load of toxic elements by their successful transformation and remediation. Describes many novel approaches of microbial bioremediation including genetic engineering, metagenomics, microbial fuel cell technology, biosurfactants and biofilm-based bioremediation Introduces relatively new hazardous elements and their bioremediation practices including oil spills, military waste water, greenhouse gases, polythene wastes, and more Provides the most advanced techniques in the field of bioremediation, including insilico approach, microbes as pollution indicators, use of bioreactors, techniques of pollution monitoring, and more

The huge expansion of the chemical and petroleum industries in the twentieth century has resulted in the production of a vast array of chem ical compounds and materials that have transformed our lives. The associated large-scale manufacturing, processing and handling activi ties have caused a serious deterioration in environmental quality and created threats to human health. These negative impacts have led to responses and regulations requiring remedial action in support of envi ronmental sustainability. of biotechnological methods through bioremediation,

Application has gained prominence as an option for soil remediation methods. Bioremediation is a multidisciplinary approach where biologists, chem ists, soil scientists and engineers work as team to develop and imple ment remediation processes. Bioremediation has now been used successfully to remediate many petroleum-contaminated sites. However, there are as yet no commercial technologies commonly used to reme diate the most recalcitrant contaminants. Nevertheless, bioremediation is a rapidly advancing field and new bio-based remedial technologies are continuing to emerge.

Bioremediation

Applied Bioremediation

Pesticide Contamination in Freshwater and Soil Environs

Impacts, Threats, and Sustainable Remediation

This book presents a broad compendium of biodegradation research and discussions on the most up-to-date bioremediation strategies. The most relevant microbiological, biochemical and genetic concepts are presented alongside the fundamentals of bioremediation. The topics include: a wide variety of contaminant impacts evaluation, key methodologies required to measure biodegradation and propose new bioremediation protocols, as well as the handling of microbial communities related to

such processes. The selected collaborating authors are renowned for their microbiology expertise and will provide an in-depth reference for students and specialists. The contents provide a valuable source of information for researchers, professionals, and policy makers alike.

Pesticides in the Natural Environment: Sources, Health Risks, and Remediation presents the direct and indirect impacts of the use of pesticides on the environment, human health, and agriculture. The book explores sustainable alternatives to pesticide use, along with policies for regulations and remediation techniques. Bridging the gap between regulations and the tangible environmental threat, the book proposes practical solutions while also providing important context on the hazards of pesticides. It highlights the influence on climate change, offering a holistic perspective for researchers in environmental science, policymakers, and land managers. The book introduces pesticides and their applications, then goes on to cover their impact on various ecosystems in the natural environment. Health risks are covered, followed by various remediation techniques, such as biological processes, phytoremediation, and chemical treatments. Describes the impact of pesticides on the environment, human health and the food chain as well as regulations and policies to address the impact Presents remediation strategies and techniques for pesticides in a variety of ecosystems, along with potential alternatives Includes case studies to illustrate the proper

management of pesticides and intervention

This book will discuss the effective and sustainable technological approaches for remediation of contaminates via eco-friendly usage of microbes. The primary focus will be on the role of microbes, particularly bacteria and fungi, for the degradation and removal of various xenobiotic substances in the environment. The book will also emphasize molecular approaches and biosynthetic pathways of microbes, and present gene and protein expression studies for bio-deterioration techniques. New innovative and sophisticated green technologies for waste minimization and waste control will be presented, as well as the potential of microbes for various techniques of bioremediation, including bio-sorption, bio-augmentation, bio-stimulation, to clean contaminated environments.