


# Microbiology of Solid Waste Treatment

- Commercial and backyard composting
    - Alternative to landfills
    - Backyard composting involves mixing debris
      - Waste is reduced by 2/3 in matter of months
      - Black organic material can be used in garden beds
    - Compost pile usually starts with supply of organic material
      - Often some soil and water are added
    - Inside of pile heats to 55° to 60° C
      - Pathogens killed, thermophilic organisms unaffected
- 
- Aeration of pile via stirring when pile cools
  - Composting on large scale way to reduce garbage going to landfill
    - Special machinery used for large scale composting

# Microbiology Of Solid Waste

**Bibhuti Bhusan Mishra, Suraja Kumar  
Nayak, Swati Mohapatra, Deviprasad  
Samantaray**

## **Microbiology Of Solid Waste:**

Microbiology of Solid Waste Morton A. Barlaz, Anna C. Palmisano, 2020-07-09 Interest in solid waste disposal has been growing since the early 1960s when researchers emphasized the potential for solid waste to harbor pathogenic microorganisms. Since then, society has become more interested in the environmental impacts of solid waste treatment and disposal and how biological processes are used to minimize these impacts. This new text provides a basic understanding of the unique microbial ecosystems associated with the decomposition of municipal solid waste (MSW). It addresses the challenges of sampling and assaying microbial activities in MSW and describes preferred methods. The decomposition of MSW under anaerobic conditions in landfills and digestors is described as well as under aerobic conditions during composting. The *Microbiology of Solid Wastes* discusses the need to consider MSW as an integrated system of collection, recycling, treatment, and disposal. A better understanding of solid waste microbiology will contribute to safe and economical solid waste management. Microbiologists, environmental engineers, and solid waste managers will all find this a useful reference.

*Microbiology of Solid Waste* Anna C. Palmisano, Morton A. Barlaz, 2020-07-09 Interest in solid waste disposal has been growing since the early 1960s when researchers emphasized the potential for solid waste to harbor pathogenic microorganisms. Since then, society has become more interested in the environmental impacts of solid waste treatment and disposal and how biological processes are used to minimize these impacts. This new text provides a basic understanding of the unique microbial ecosystems associated with the decomposition of municipal solid waste (MSW). It addresses the challenges of sampling and assaying microbial activities in MSW and describes preferred methods. The decomposition of MSW under anaerobic conditions in landfills and digestors is described as well as under aerobic conditions during composting. The *Microbiology of Solid Wastes* discusses the need to consider MSW as an integrated system of collection, recycling, treatment, and disposal. A better understanding of solid waste microbiology will contribute to safe and economical solid waste management. Microbiologists, environmental engineers, and solid waste managers will all find this a useful reference.

**Environmental Microbiology of Aquatic and Waste Systems** Nduka Okafor, 2011-06-21 This book places the main actors in environmental microbiology, namely the microorganisms, on center stage. Using the modern approach of 16S ribosomal RNA, the book looks at the taxonomy of marine and freshwater bacteria, fungi, protozoa, algae, viruses, and the smaller aquatic animals such as nematodes and rotifers, as well as at the study of unculturable aquatic microorganisms, metagenomics. The peculiarities of water as an environment for microbial growth and the influence of aquatic microorganisms on global climate and global recycling of nitrogen and sulphur are also examined. The pollution of water is explored in the context of self-purification of natural waters. Modern municipal water purification and disease transmission through water are discussed. Alternative methods for solid waste disposal are related to the economic capability of a society. Viruses are given special attention. By focusing on the basics, this primer will appeal across a wide range of disciplines.

### **Environmental Microbiology and Biotechnology** Anoop Singh, Shaili Srivastava, Dheeraj Rathore, Deepak

Pant, 2020-09-23 This book provides up to date information on the state of the art in applications of biotechnological and microbiological tools for protecting the environment. Written by leading international experts it discusses potential applications of biotechnological and microbiological techniques in solid waste management, wastewater treatment, agriculture, energy and environmental health. This first volume of the book *Environmental Microbiology and Biotechnology* covers three main topics: Solid waste management, Agriculture utilization and Water treatment technology, exploring the latest developments from around the globe regarding applications of biotechnology and microbiology for converting wastes into valuable products and at the same time reducing the environmental pollution resulting from disposal. Wherever possible it also includes real world examples. Further it offers advice on which procedures should be followed to achieve satisfactory results and provides insights that will promote the transition to the sustainable utilization of various waste products.

### Environmental and Agricultural Microbiology Bibhuti Bhusan Mishra, Suraja Kumar Nayak, Swati Mohapatra, Deviprasad

Samantaray, 2021-09-22 *Environmental and Agricultural Microbiology* Uniquely reveals the state of the art microbial research advances in the environment and agriculture fields. *Environmental and Agricultural Microbiology: Applications for Sustainability* is divided into two parts which embody chapters on sustenance and life cycles of microorganisms in various environmental conditions, their dispersal, interactions with other inhabited communities, metabolite production and reclamation. Though books pertaining to soil, agricultural microbiology, environmental biotechnology are available, there is a dearth of comprehensive literature on the behavior of microorganisms in the environmental and agricultural realm. Part 1 includes bioremediation of agrochemicals by microalgae, detoxification of chromium and other heavy metals by microbial biofilm, microbial biopolymer technology including polyhydroxyalkanoates (PHAs) and polyhydroxybutyrates (PHB), their production, degradability, behaviors and applications. Biosurfactants production and their commercial importance are also systematically represented in this part. Part 2, having 9 chapters, facilitates imperative ideas on approaches for sustainable agriculture through functional soil microbes, next generation crop improvement strategies via rhizosphere microbiome, production and implementation of liquid biofertilizers, mitigation of methane from livestock, chitinases from microbes, extremozymes, an enzyme from extremophilic microorganism and their relevance in current biotechnology, lithobiontic communities and their environmental importance have all been comprehensively elaborated. In the era of sustainable energy production, biofuel and other bioenergy products play a key role and their production from microbial sources are frontiers for researchers. The final chapter unveils the importance of microbes and their consortia for management of solid waste in amalgamation with biotechnology. Audience: The book will be read by environmental microbiologists, biotechnologists, chemical and agricultural engineers.

### **Microbiology of Landfill Sites** Eric Senior, 1995-03-03

This book was originally published in 1990 and was the first text to consider the definitive fundamental science of landfill biotechnology. Since then

major research initiatives particularly in the U K and South Africa have resulted in considerable advancement in our knowledge of landfill microbiology The Second Edition details this progress Text considers the latest findings in landfill leachate treatment co disposal and fundamental microbiology It brings together the expertise of the immediate complementary but often disparate disciplines of soil science environmental engineering applied mathematics and land reclamation and focuses on the common goal of the scientific design and management of landfill sites The book also includes effective laboratory models and selected approaches *Microbiology* P. D. Sharma,2007

**Microbiology of Composting** Heribert Insam,Nuntavun Riddech,Susanne Klammer,2013-03-14 Composting is increasingly used as a recycling technology for organic wastes Knowledge on the composition and activities of compost microbial communities has so far been based on traditional methods New molecular and physiological tools now offer new insights into the black box of decaying material An unforeseen diversity of microorganisms are involved in composting opening up an enormous potential for future process and product improvements In this book the views of scientists engineers and end users on compost production process optimisation standardisation and product application are presented

**Biosafety in the Laboratory** Division on Engineering and Physical Sciences,Commission on Physical Sciences, Mathematics, and Applications,Committee on Hazardous Biological Substances in the Laboratory,National Research Council,1989-01-01 Biosafety in the Laboratory is a concise set of practical guidelines for handling and disposing of biohazardous material The consensus of top experts in laboratory safety this volume provides the information needed for immediate improvement of safety practices It discusses high and low risk biological agents including the highest risk materials handled in labs today presents the seven basic rules of biosafety addresses special issues such as the shipping of dangerous materials covers waste disposal in detail offers a checklist for administering laboratory safety and more

Environmental Pollutants and their Bioremediation Approaches Ram Naresh Bharagava,2017-07-06 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

**Municipal Solid Waste** Nikolaos Tzortzakakis,2017 Solid waste has grown into a relatively difficult problem to solve for those responsible for its management these responsibilities include the collection transport treatment and disposal of solid wastes particularly wastes generated in medium and large urban centres This problem is even more intense in economically developing countries where the financial human and other critical resources are scarce in general In the last decade there has been a great interest and awareness regarding the environmentally safe management of waste worldwide centralised in legislative administrative standardisation and research

activities in this field Therefore it is essential to develop short and long term waste management strategies often named the 3Rs and their consequent implementation in compliance with the formulated priorities for waste 1 Reduce 2 Recycle 3 Reuse and 4 environmentally safe disposal Several contradictions and lack of agreement still exist even regarding the major basic definitions e g which material should be treated as waste and which as a beneficial raw material which wastes are hazardous and which are non hazardous etc Quite often different approaches and as a consequence waste management disposals are adopted for the same situation materials Environmental risk assessment procedures and mode of actions are varied greatly not only within national levels but also at regional levels within the same country by different groups of scientists and or policy makers The general idea of the book has arisen from the mutual experience of many specialists in numerous disciplines from different countries involved in the problem of environmental assessment economic and monitoring approaches and control approaches for chemicals generated from solid waste disposal Solid waste worldwide issues nowadays reflect the complexity and unbalanced development of our world at the beginning of the 21st century This book covers a broad group of wastes from biowaste to hazardous waste The contributors to the book are recognised experts in the diverse fields associated with the issues of waste management and the reuse recycle of materials and are from different parts of the world Authors present their experience and approaches considering both international and national local specifics The book is addressed to the wide range of end users decision makers and professionals involved in environmental and agricultural issues administration designers manufacturers policy makers farmers researchers academics and university students and is focused on waste properties environmental behaviour and management in an environmentally safe way It was not the intention of the editor authors to exhaust the subject which is intensely broad but to give a general idea with updating trends in the field of solid waste management concerning disposal monitoring assessment and remedial options which are demonstrated also in case studies The authors hope that this book to some extent will contribute to the trials and efforts for the proper environmentally safe practices of solid waste disposal and will provide state of the art information and discussion monitoring strategies advanced approaches and methods techniques and equipment for environmentally safe disposal and remediation of solid wastes

*Microbiology of Landfill Sites* Eric Senior, 2020-01-29 This book was originally published in 1990 and was the first text to consider the definitive fundamental science of landfill biotechnology Since then major research initiatives particularly in the U K and South Africa have resulted in considerable advancement in our knowledge of landfill microbiology The Second Edition details this progress Text considers the latest findings in landfill leachate treatment co disposal and fundamental microbiology It brings together the expertise of the immediate complementary but often disparate disciplines of soil science environmental engineering applied mathematics and land reclamation and focuses on the common goal of the scientific design and management of landfill sites The book also includes effective laboratory models and selected approaches

**Safe Management of Wastes from Health-care Activities** Yves

Chartier,2014 This is the second edition of the WHO handbook on the safe sustainable and affordable management of health care waste commonly known as the Blue Book The original Blue Book was a comprehensive publication used widely in health care centers and government agencies to assist in the adoption of national guidance It also provided support to committed medical directors and managers to make improvements and presented practical information on waste management techniques for medical staff and waste workers It has been more than ten years since the first edition of the Blue Book During the intervening period the requirements on generators of health care wastes have evolved and new methods have become available Consequently WHO recognized that it was an appropriate time to update the original text The purpose of the second edition is to expand and update the practical information in the original Blue Book The new Blue Book is designed to continue to be a source of impartial health care information and guidance on safe waste management practices The editors intention has been to keep the best of the original publication and supplement it with the latest relevant information The audience for the Blue Book has expanded Initially the publication was intended for those directly involved in the creation and handling of health care wastes medical staff health care facility directors ancillary health workers infection control officers and waste workers This is no longer the situation A wider range of people and organizations now have an active interest in the safe management of health care wastes regulators policy makers development organizations voluntary groups environmental bodies environmental health practitioners advisers researchers and students They should also find the new Blue Book of benefit to their activities Chapters 2 and 3 explain the various types of waste produced from health care facilities their typical characteristics and the hazards these wastes pose to patients staff and the general environment Chapters 4 and 5 introduce the guiding regulatory principles for developing local or national approaches to tackling health care waste management and transposing these into practical plans for regions and individual health care facilities Specific methods and technologies are described for waste minimization segregation and treatment of health care wastes in Chapters 6 7 and 8 These chapters introduce the basic features of each technology and the operational and environmental characteristics required to be achieved followed by information on the potential advantages and disadvantages of each system To reflect concerns about the difficulties of handling health care wastewaters Chapter 9 is an expanded chapter with new guidance on the various sources of wastewater and wastewater treatment options for places not connected to central sewerage systems Further chapters address issues on economics Chapter 10 occupational safety Chapter 11 hygiene and infection control Chapter 12 and staff training and public awareness Chapter 13 A wider range of information has been incorporated into this edition of the Blue Book with the addition of two new chapters on health care waste management in emergencies Chapter 14 and an overview of the emerging issues of pandemics drug resistant pathogens climate change and technology advances in medical techniques that will have to be accommodated by health care waste systems in the future Chapter 15

**Environmental Microbiology for Engineers** Volodymyr Ivanov,2015-11-04 Updated Edition Includes a

New Chapter and Enhanced Study Material

The second edition of *Environmental Microbiology for Engineers* explores the role that microorganisms play in the engineered protection and enhancement of an environment. Offering a perfect balance of microbiological knowledge and environmental biotechnology principles, it provides a **Emerging and Eco-Friendly Approaches for Waste Management**. Ram Naresh Bharagava, Pankaj Chowdhary, 2018-05-25

Rapid industrialization is a serious concern in the context of a healthy environment. With the growth in the number of industries, the waste generated is also growing exponentially. The various chemical processes operating in the manufacturing industry generate a large number of by-products which are largely harmful and toxic pollutants and are generally discharged into the natural water bodies. Once the pollutants enter the environment, they are taken up by different life forms and, because of bio-magnification, they affect the entire food chain and have severe adverse effects on all life forms, including human health. Although various physico-chemical and biological approaches are available for the removal of toxic pollutants, unfortunately, these are often ineffective, and traditional clean-up practices are inefficient. Biological approaches utilizing microorganisms (bacteria, fungi, algae, green plants) or their enzymes to degrade or detoxify environmental pollutants such as endocrine disruptors, toxic metals, pesticides, dyes, petroleum hydrocarbons, and phenolic compounds offer eco-friendly approaches. Such eco-friendly approaches are often more effective than traditional practices and are safe for both industry workers as well as the environment. This book provides a comprehensive overview of various toxic environmental pollutants from a variety of natural and anthropogenic sources, their toxicological effects on the environment, humans, animals, and plants, as well as their biodegradation and bioremediation using emerging and eco-friendly approaches, e.g., Anammox technology, advanced oxidation processes, membrane bioreactors, membrane processes, GMOs, microbial degradation (e.g., bacteria, fungi, algae), phytoremediation, biotechnology, and nanobiotechnology. Offering fundamental and advanced information on environmental problems, challenges, and bioremediation approaches used for the remediation of contaminated sites, it is a valuable resource for students, scientists, and researchers engaged in microbiology, biotechnology, and environmental sciences.

*Advances in Solid and Hazardous Waste Management* Sudha Goel, 2017-08-03

This book presents reviews, examples, and case studies of innovative applications in solid and hazardous waste management. The economics of waste management have since become a significant research area in their own right, and two chapters address these issues. In addition, dedicated chapters cover specific categories of waste such as biomedical and institutional waste, plastics, and e-waste. The book subsequently discusses newer analytical methods like SEM, EDX, XRD, and optical microscopy, along with selected older methods for sampling and characterizing different types of waste. The various applications of mathematical tools like linear optimization, various software models like WISLeach and DRASTIC, and tools like remote sensing and GIS are illustrated in many of the chapters. Lastly, since composting is one of the most popular treatment methods for managing the organic component of municipal solid waste, the book provides an overview of composting and the fundamentals of microbiology that are essential to



understanding waste related biological processes The book was primarily written for students and practitioners in the field who are already familiar with the basics All chapters were prepared by practicing experts and scholars in the field and are intended to help readers better understand and apply these principles and practices in their own endeavours Key topics covered in the book The circular economy and the economics of solid waste management Various remote sensing and GIS applications for managing municipal solid waste coal fires in mines changes in land use and land cover in industrial areas etc Treatment and management of different types of solid waste institutional including biomedical residential e waste plastic and ash from thermal power plants Sampling and characterization of municipal waste and compost Fundamentals of microbiology Overview of environmental regulations especially those pertaining to solid and hazardous waste management **Waste**

**Management for the Food Industries** Ioannis S. Arvanitoyannis, 2010-07-28 The continuously increasing human population has resulted in a huge demand for processed and packaged foods As a result of this demand large amounts of water air electricity and fuel are consumed on a daily basis for food processing transportation and preservation purposes Although not one of the most heavily polluting the food industry does contribute to the increase in volume of waste produced as well as to the energy expended to do so For the first time nine separate food industry categories are thoroughly investigated in Waste Management for the Food Industries in an effort to help combat this already acute problem The current state of environmental management systems is described offering comparisons of global legislation rarely found in other resources An extensive review of commercial equipment including advantages and disadvantages per employed waste management technique offers a unique perspective for any academic student professional and or consultant in the food agriculture and environmental industries Thoroughly examines the most prevalent and most polluting industries such as Meat Fish Dairy Olive Oil Juice and Wine industries Includes synoptical tables methods employed physicochemical or microbiological parameters altered after treatment etc and comparative figures of the effectiveness of various waste management methods Contains nearly 2500 of the most up to date references available *Environmental Microbiology*

Ralph Mitchell, Ji-Dong Gu, 2010-01-08 The bestselling reference on environmental microbiology now in a new edition This is the long awaited and much anticipated revision of the bestselling text and reference Based on the latest information and investigative techniques from molecular biology and genetics this Second Edition offers an in depth examination of the role of microbiological processes related to environmental deterioration with an emphasis on the detection and control of environmental contaminants Its goal is to further our understanding of the complex microbial processes underlying environmental degradation its detection and control and ultimately its prevention Features new to this edition include A completely new organization with topics such as pathogens in developing countries effects of genetically modified crops on microbial communities and transformations of toxic metals Comprehensive coverage of key topics such as bacteria in the greenhouse and low energy waste treatment New coverage relating core book content to local regional and global

environmental problems Environmental Microbiology Second Edition is essential reading for environmental microbiologists and engineers general environmental scientists chemists and chemical engineers who are interested in key current subjects in environmental microbiology It is also appropriate as a textbook for courses in environmental science chemistry engineering and microbial ecology at the advanced undergraduate and graduate levels *Waste Incineration and Public Health* National Research Council, Commission on Life Sciences, Board on Environmental Studies and Toxicology, Committee on Health Effects of Waste Incineration, 2000-10-21 Incineration has been used widely for waste disposal including household hazardous and medical waste but there is increasing public concern over the benefits of combusting the waste versus the health risk from pollutants emitted during combustion *Waste Incineration and Public Health* informs the emerging debate with the most up to date information available on incineration pollution and human health along with expert conclusions and recommendations for further research and improvement of such areas as risk communication The committee provides details on Processes involved in incineration and how contaminants are released Environmental dynamics of contaminants and routes of human exposure Tools and approaches for assessing possible human health effects Scientific concerns pertinent to future regulatory actions The book also examines some of the social psychological and economic factors that affect the communities where incineration takes place and addresses the problem of uncertainty and variation in predicting the health effects of incineration processes

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