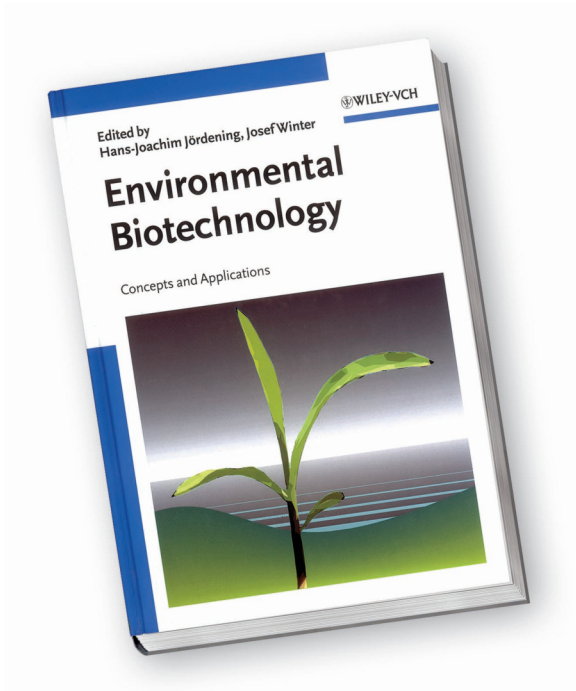
Environmental Biotechnology Concepts and Applications

Edited by Hans-Joachim Jördening and Josef Winter

Environmental biotechnology was initially a science of wastewater treatment and at the turn of the 20th century was extended, among others, to soil remediation, off- gas purification, surface and groundwater cleaning, deposition techniques for solid waste in sanitary landfills, composting and bioorganic recycling.

The subsequent progress in research gives the editors the opportunity to update knowledge in the various fields of environmental biotechnology. The idea of inviting experts to contribute to each chapter of *Environmental Biotechnology* was excellent, helping to present the significant advances in their fields as observed in recent years. The comprehensive overview of the processes of environmental biotechnology allows the reader to obtain fundamental information and also to view future perspectives for developing processes for liquid, solid and gaseous waste treatment.



WILEY-VCH Verlag GmbH & Co. KGaA
Weinheim 2005
ISBN 3-527-30585-8

For many decades, due to costly investments in sewer systems and wastewater treatment facilities, researchers have been focusing on the mechanical efficiency of systems; nowadays, as the authors show, an understanding of the microbiological processes gives us an opportunity to look at new facets of high-efficiency carbon, nitrogen and phosphate removal. The authors conclude that starters cultures, enzymes or even modification of microorganisms are now essential tools in improving purification efficiency or in degrading trace compounds.

Until only recently, solid domestic waste and residues from industrial production were collected and deposited in sanitary landfills. The authors show that most waste pretreatment and treatment procedures, other than deposition in landfills, have been developed over the last two decades. To achieve a low carbon content (of about 5%) of organic dry matter, solid wastes have to be biologically pretreated by composting or by fermentation. The authors indicate that among other reasons for development of composting are the rising costs of deposit in landfills, more vigorous environmental protection requirements and the need to recycle refuse back to the soil. In contrast to the commonly established composting processes, the technique of anaerobic fermentation of solid waste is relatively new and promising. The technological potential of biowaste fermentation has not yet been fully determined. One of the more pressing problems of environmental biotechnology presented in the book is the removal of organic and inorganic pollutants from highly polluted waste gas streams. Off gases can be purified by gas washing and the aerobic and anaerobic treatment of washing water by biofilter. The efficiency of biofilter methods depends on the permanent high adsorption of synthetic filter materials used as a support for the development of microorganisms forming the biofilm.

A further problem considered in the book is connected with soil remediation. Due to the large number of pollutants and different soil and underground structures no general guidelines for soil remediation have been established. To support or enhance the natural biodegradation ability of soil microorganisms, bioaugmentation and biostimulation technologies are suitable for remediation.

Environmental Biotechnology makes it clear that the future of environmental biotechnology is strictly dependent on the development and application of molecular and genetic methods. In this way it will become possible to recognize structures and new possibilities for the treatment and biodegradation of pollutants.

Irena Wojnowska-Baryła
Department of Environmental Biotechnology
University of Warmia and Mazury in Olsztyn, Poland