Biotechnological Applications of Microorganisms
A Techno-Commercial Approach

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I.K. International
Biotechnological Applications of Microorganisms
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Preface

Recent concern over the commercial exploitation of potential microorganisms has necessitated to provide a holistic view due to their pivotal role in the biotechnology industry. Microorganisms thrive in diverse habitats in various ecosystems. Now-a-days microorganisms have been developed in different viable forms both in situ as well as indirectly in some form or the other. This facilitated the effective development of the bioinoculants industries. They are as effective as pure chemicals in addition having market-friendly and above all true to work assigned to them. Psychrophiles persist where others perish due to their extreme habits after comparing with standard models such as *E. coli* or *Bacillus subtilis*. Having secrets to microbial successes proved potential gold mine for industries. Lactic acids as microbial metabolites have been extensively discussed. Enzymes are machines to biotechnological innovations. Microbially-mediated enzymatic reactions have been found useful due to their environment friendly processes. Production of secondary metabolites such as ergot alkaloids proved as one of the emerging molecules in medicinal biotechnology. Similarly, fatty acids are used in a wide range of industrial products but their value enhanced if converted microbially. Actinomycetes and their potential products in the form of antibiotics still captured about 60% of market in the biotechnology industries. Beside, they have proved successful in control of harmful plants/insect pathogens also being ecofriendly and cheap. Prevention and suppression of diseases in insects by use of entomopathogenic fungi renders safety for humans and non-target organisms. Their impact has necessitated the development of suitable bioformulation for field applications. Modern biotechnology has given some expectations from *Fusarium* as never before. Diversity of fusaria, their recent applications and new developments have diversified the directions for the commercial applications. Microbial production of 1-3, propanediol and its applications have been highlighted and industrial methods discussed for the production of a wide variety of aldehydes, organic acids and their derivatives.

On the other hand, the role of GM in crop production focusing on the input of transgenes from the microbial world may be the only solution to feed more world population. In spite of tremendous properties, the other side of coin of these microbes i.e. in disease development, cannot be ignored but microbes and their products in the form of novel compounds are the solution to act against soil-borne pathogens. Genomics or the organisms total DNA and its complete sequencing is a recent development to resolve various constraints in biotechnology-related industries including medicine, agriculture, food and environmental biotechnology-related business. Indeed, the largest number of commercial applications of microorganisms predominantly are applied in bioaugmentation, bioremediation of heavy metals, agrochemicals including pesticides. Even, fungal biomass suitable system act as bioabsorbents for removal and recovery of heavy metals from contaminated sites. Conventional therapeutic methods are now being well recognized throughout the world. Biological molecules in coffee beverages
acted as antimicrobial agents to combat the ever-increasing menace of bacterial resistance due to their continuous applications. All the articles of this volume reflect the application of the microorganisms to industries. The processes and products may lead to industrial sectors so that the society may be truly benefited.

D.K. Maheshwari
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As a young scientist, he was selected under UNESCO programmes and worked in Biological Research Centre, Szeged (Hungary) in the year 1983-84 and also visited Czechoslovakia, Belgium, Holland, Germany, Japan and S. Korea. He was visiting Professor in Science University of Tokyo, in 1993 and 1998, and Guest Professor, in the University of Ulm (Germany). Prof. Maheshwari visited S. Korea in the year 2000, 2003 and 2006 under bilateral scientific exchange programmes sponsored by Indian National Science Academy (INSA), New Delhi.

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He is recipient of a number of awards including best 30 scientists of Korea (2002) and outstanding Research Scientist award from Daegu University (2005). He has several papers in leading peer reviewed journals and granted US and Korean patents on different technologies involved in the area of Microbiology and Biotechnology.
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