Chapter 16
Microbiology Education for Biotechnology Industry

K. K. Pal
Directorate of Groundnut Research, India

R. Dey
Directorate of Groundnut Research, India

K.V. B. R. Tilak
Osmania University, India

ABSTRACT

Microbial technology finds innumerable applications in different sectors of biotechnology industry. The scope and potential of microbiology education in different sectors is vast and has direct relation to societal benefit. Microbiology is generally taught at the post-graduate levels for students having basic degree in science (life sciences with subjects like Botany, Zoology, Chemistry, etc.). Microbiology being a vast discipline with many areas like Medical-, Veterinary-, Dairy-, Agricultural-, Food-, Environmental-, Industrial-, Marine Microbiology, etc. requires specific training and development of skills for specialization in a particular area. The requirements of each sector are different and specialized training and exposure is needed to develop professionals. Microbiologists have great demand in the industries like pharmaceutical, food, and biotechnology industries preparing enzymes, etc. The microbiologists get job in product development, processing, production, and quality control. Similarly there is demand for microbiologists in food and catering industries in the areas of quality control and in maintaining hygiene.

INTRODUCTION

Looking into the myriad of employment opportunities in Microbiology and related industries, pure science graduates can also be trained for developing skills and honing knowledge pertinent to the specific needs of the industry. Science graduates can avail training facilities offered by many universities, research institutes and industries for employment opportunities in pharmaceutical, dairy, food and biotechnology industries. Many pharmacy industries give apprenticeship for 3

DOI: 10.4018/978-1-4666-2845-8.ch016

Copyright © 2013, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

months to 1 year, before employing science graduates. Trained graduates can be self-employed or get employment in biofertilizer or biopesticide production industries. Similarly for wine and beer industries and baker's yeast production units – science graduates can be trained and become professionals in these food and beverages industries. There is demand for these graduates in the clinical facilities available in cities and towns. Science graduates trained in Clinical Microbiology find employment in hospitals and clinics. This chapter discusses the major fields of applied microbiology, the major classes of products and processes, microbiology education in India, the training needed for getting employment in biotechnology industries, the career opportunities for graduates and the future prospects of microbiology and biotechnology education.

The Microbiology and Biotechnology education should be professionalized for a knowledge economy. This will involve developing courses having equal share of knowledge, skills and values; giving more emphasis on multidisciplinary approach; involving the stakeholders of microbiology/biotechnology education in designing of course curricula and getting regular feedbacks from the industry about their requirements. This will improve the employability of the science graduates in biotechnology industry as well as provide benefit to the society at large.

Microbial technology has existed since the beginning of human life on earth, without the people being aware of it. Certain changes like transformation of milk into curd, fermentation for the production of wine and beer and use of baker's yeast for production of bread, etc. have been known to mankind for thousands of years. With the advancement of science, newer dimensions are being added to the science of Microbiology, for multiple societal benefits.

Microbial biotechnology is the application of scientific and engineering principles to the processing of materials by microorganisms (such as bacteria, fungi, algae, protozoa and viruses) or plant and animal cells to create useful products or processes. The microorganisms utilized may be natural isolates, laboratory selected mutants or microbes that have been genetically engineered using recombinant DNA methods.

Now-a-days the microbial technology caters to the wide range of human needs in medicine, agriculture, industry, environmental management, etc. Areas of industrial microbiology include quality assurance for the food, pharmaceutical, and chemical industries. Industrial microbiologists may also be responsible for discovery of new organisms and pathways. For instance, most antibiotics come from microbial fermentations involving a group of organisms called actinomycetes. Additional groups of microorganisms form products that range from organic acids to enzymes used to create various sugars, amino acids, and detergents. Industrial microbiologists may also deal with products associated with the food and dairy industries, with the prevention and deterioration of processed or manufactured goods, and with waste disposal systems.

Microbial technology has immense potential not only for developing professionals but also to cater to the need of the society. The modern universities have great educational and intellectual talents within its faculty and staff to serve society by nurturing the interests in its state and region in ways that meet, not university needs, but needs of the community as a whole (Magrath, 2006). The different stakeholders in biotechnology, i.e. university, industry, society, etc. all have to work together in the areas of meaningful partnership and have to work in tandem to reap the maximum benefits from microbial technology.

In this paper some of the new approaches that can be adopted for integrating education and research in microbial technology with biotechnology industry have been discussed.

17 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/microbiology-education-biotechnology-industry/73753

Related Content

Career and Technical Education in Light of the No Child Left Behind Legislation
Edward C. Fletcher Jr.and Chris Zirkle (2009). *Handbook of Research on E-Learning Applications for Career and Technical Education: Technologies for Vocational Training (pp. 495-507).*
www.irma-international.org/chapter/career-technical-education-light-child/19996

A Suggested Curriculum in Career Education to Develop Business Secondary Schools Students' Career Knowledge Management Domains and Professional Thinking
Faten Abdelmagied Elsoudy Fouda (2018). *Business Education and Ethics: Concepts, Methodologies, Tools, and Applications (pp. 166-189).*
www.irma-international.org/chapter/a-suggested-curriculum-in-career-education-to-develop-business-secondary-schools-students-career-knowledge-management-domains-and-professional-thinking/186574

Future Opportunities in Imagineering Management
Sonika Sumanand Mattew Kuofie (2021). *Handbook of Research on Future Opportunities for Technology Management Education (pp. 178-200).*
www.irma-international.org/chapter/future-opportunities-in-imagineering-management/285363

Politics or Pedagogy?: The Emergence of Workplace-Based Learning in South Africa
Ronel Blom (2019). *Global Perspectives on Work-Based Learning Initiatives (pp. 26-56).*
www.irma-international.org/chapter/politics-or-pedagogy/213468

Community Colleges' Role in Workforce Development and Education: Past, Present, and Future of Workforce Education Programs
Shante Hackworth (2021). *Community Colleges and Workforce Preparation in the 21st Century: Emerging Research and Opportunities (pp. 132-154).*
www.irma-international.org/chapter/community-colleges-role-in-workforce-development-and-education/275861