Preface

Bioresource technology incorporates a wide spectrum of science and technology, including engineering sciences. It involves applied biological sciences for investigating the present-day subjects of biosciences, mainly for the industrial, food, and environmental sectors. Principles from such scientific disciplines as biochemistry, bioprocess technology, chemical engineering, enzyme technology, food and fermentation technology, molecular biology, microbiology, microbial technology, etc., are strongly practiced by biotechnologists, chemical engineers, resource, energy, and conservation scientists, process technologists, applied microbiologists, farm and industrial waste technologists, etc., in applying bioresource technology for industrial, food, and environmental applications. Gradual emergence of new technologies for large-scale conversions of renewable raw materials of biological origin to various industrial and energy markets has further widened the scope of bioresource technology. Thus, it was a timely decision made by The Haworth Press, Inc. to publish this encyclopedia. We have made a conscious and careful effort to select and discuss vivid topics related with the subject, including biomass, bioenergy, biowastes, production technologies, microbial growth processes, enzymatic methods, agricultural and food processing residues, municipal wastes, environmental protection, bioremediation, recycling, aerobic methods, anaerobic digestion, etc.

Forty-four chapters are covered in this encyclopedia, describing the application of bioresource technology in three sectors—environmental biotechnology, food biotechnology, and industrial biotechnology.

Part I, Environmental Biotechnology, comprises 11 chapters and 19 articles. The first chapter provides a brief overview of recent advances in biological wastewater treatment. Two related chapters are included, one on reactors for wastewater treatment (biological reactors, membrane bioreactor, rotating biological contractors, trickling filters, and waste stabilization ponds) and another on treatment of industrial effluents (distillery effluent, pulp and paper mill effluent, removal of heavy metals from wastewater, tannery effluent, and textile and dye effluent). The development of such bioprocesses as biobeneficiation, biodegradation of polycyclic aromatic hydrocarbons, biofiltration, biological control of air pollution, biomethano-

genesis, bioremediation, and microbiologically influenced corrosion are discussed in other chapters in this section.

Part II, Food Biotechnology, includes 14 chapters, two of which deal with fermented products, i.e., fermented vegetables products and fermented milk products. Food products production is an important area of food biotechnology, hence several chapters cover the production of food additives, food-grade yeast, mushrooms, nutraceuticals, prebiotics, probiotics, single-cell protein, vitamins, and xanthan gum. A chapter on kefir yeast technology provides information on recent technological developments in this area. The section also includes three chapters on biopolymer application, biotransformations of citrus flavone glycosides, and molecular methods for microbial detection and characterization for food safety.

The third and final part, Industrial Biotechnology, includes 19 chapters, incorporating 22 articles. The first chapter in this section, which covers alcoholic fermentation, describes bacterial alcoholic fermentation, fruit-based alcoholic beverages, fuel ethanol from renewable biomass resources, grape-based alcoholic beverages, malted barley, Scotch whiskey, beer, and thermotolerant and osmo-tolerant yeasts for alcoholic fermentation. Three chapters dealing with the production of alkaloids, aflatoxins and other secondary metabolites, amino acids, and antibiotics follow. A chapter on the application of agro-industrial residues for bioprocesses describes specific examples of industrial residues from the cassava industry, coffee industry, palm oil industry, and seafood industry. Two related chapters discuss pretreatment of lignocellulosic substrates and recycling of agricultural by-products and residues for animal feeding. Yet another related chapter discusses solid-state fermentation for the bioconversion of biomass, providing insight about the general aspects, design, engineering, and modeling of solid-state fermentation. Several chapters describe the production of commercially important microbial metabolites and products, such as aroma compounds, biodiesel, biofertilizers, biosurfactants, pigments, polyhydroxyalkanoates, and xylitol. The process of biopulping, outlined in yet another chapter, is significant because it is environmentally friendly and offers several advantages. Enzymes and organic acids from microbial sources have important industrial applications. Several therapeutic enzymes have found new applications to treat dreaded diseases such as cancer. Articles in this section describe the production and application of important enzymes, such as inulinase, laccase, lignin peroxidase, lipase, pectinase, phytase, proteases, xylanase, and L-glutaminase, and organic acids, such as citric acid, gallic acid, and lactic acid.

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