

Chapter 5

Degradation of Keratin Biomass by Different Microorganisms

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Abstract Keratins are insoluble, fibrous, and structural proteins that are present in the epidermis and its appendages and these include feather, hair, wool, nail, hoof, and horns. Keratins adhere epidermal cells to one another and provide protection on the skin. They are structurally stabilized by their tightly packed peptide chains and the existence of several cross-linkages by disulphide bonds, hydrogen bonding, and hydrophobic interactions. Keratin-containing materials are generated abundantly as by-products of agro-industrial processing and constitute nuisance in the environment as a result of their recalcitrance to degradation by regular proteolytic enzymes like pepsin, trypsin, and papain. The traditional physical and chemical techniques for their treatment are expensive, energy consuming, can damage some essential amino acids, and non-environmentally benign. However, degradation by a variety of microorganisms had proven to be a viable alternative means of keratin treatment. A vast variety of bacteria, fungi, and actinomycetes have been recognized as keratin degraders. They degrade keratins mainly with their keratinases, which sometimes act synergistically with other enzymes like disulfide reductases and cysteine dioxygenase for effective degradation of keratins. The microbial keratinases hydrolyze keratins into soluble proteins, peptides, and amino acids. They are utility enzymes with very diverse biotechnological applications. Biodegradation of keratin-rich wastes by microorganisms is therefore an efficient, cheap, and eco-friendly method of waste management and production of products of high biotechnological value. The present review examines the trends in the role of microorganisms for the biotechnological treatment of keratin-rich wastes.

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S. Sharma and A. Kumar (eds.), *Keratin as a Protein Biopolymer*, Springer Series
on Polymer and Composite Materials, https://doi.org/10.1007/978-3-030-02901-2_5