



ABSTRACT

Management and recycling of keratinous wastes that are prevalent and abundant reservoir of pure keratin, have become one of the major environmental concerns due to their recalcitrant and complex nature. Hence, microbial degradation and recycling of keratinous waste materials into worthy byproducts considered to be an eco-friendly and economical approach. Therefore, this research work was designed to discover a potent strain, 150 isolates from different composting and dumping sites were screened for keratinase production, among which a potent strain that displayed high keratinolytic activity with complete feather valorization was identified as *Bacillus* sp. NDS-10 based on molecular identification. The influence of various physical and nutritional parameters on the keratinase production was observed in this study. The optimal conditions on which *Bacillus* sp. NDS-10 showed maximum keratinase production (92 U mL^{-1}) with respect to complete valorization of native chicken feathers (97%) in M9 medium, at 45°C under agitation speed of 150 rpm and pH 7.0 of the medium after the incubation of 20 hours. Maximum activity displayed by crude keratinase was found at 65°C and pH 7.0-8.0 Tris-Cl buffer using keratin azure (5 mg). Enzyme showed great stability over wide range of temperature ($20\text{-}60^\circ\text{C}$) and pH (6.0-10.0) for 6 h. No inhibitory effect was observed with detergents and organic solvents but keratinolytic activity was decreased by PMSF. The enzyme was partially purified keratinase showed 40 kDa molecular weight on SDS-PAGE. Crude keratinase completely de-stained the white fabric after 10 minutes incubation and effectively dehaired goat hide after 8 h of incubation without any damage. Thus, a novel isolate *Bacillus* sp. NDS-10 with a high keratinolysis property assure its potential in various industries especially in detergent formulation and leather processing industries.

Keywords

Keratinases; keratinous wastes; submerged fermentation; feather-degrading; Dehairing; *Bacillus* sp.