Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

CURRENT APPROACHES FOR RAW WOOL WASTE MANAGEMENT AND UNCONVENTIONAL VALORIZATION: A REVIEW

Hossein Rajabinejad[1,2,3], Ingrid-Ioana Bucişcanu[2], Stelian Sergiu Maier[2*]

[1]*National Engineering Laboratory for Modern Silk, College of Textile and Clothing Engineering, Soochow University, Suzhou 215123, People's Republic of China*
[2]*"Gheorghe Asachi" Technical University of Iasi, Romania, Faculty of Textiles, Leather and Industrial Management, 28 Dimitrie Mangeron Blvd., 700050, Iasi, Romania*
[3]*Politecnico di Torino, DISAT – Department of Applied Science and Technology, Corso Duca degli Abruzzi 24, 10129 Torino, Italy*

Abstract

Since the middle of the past century, when the synthetic fibers began their rise, wool has steadily lost importance in the textile sector, and now is a marginal fiber on the textiles market. Great amounts of non-marketed raw wool have turned from an income source for sheep farmers into a problematic waste, which is, at best, burned or landfilled. With increasing interest for sustainable use of natural resources, wool was reconsidered as an underrated, underused renewable resource, worthy of a better exploitation. Lately, intensive research has been done on finding solutions for wool waste valorization in non-clothing applications. Two main directions to add value to wool waste have been developed: in applications that exploit the native fiber properties, and in applications that use the keratin biopolymer, extracted from fibers by chemical solubilization or enzymatic bioconversion. Wool fibers in native state are mostly used for technical applications like green building insulation, polymer-fiber composites or sorbent materials for water pollution treatment. Keratin and its derivatives are mainly considered for the production of protein-based biomaterials for regenerative medicine. Bioconversion has a significant potential for transforming wool waste into high-value products like fertilizers for organic farming or proteolytic enzymes. The aim of this paper is to present the current management options for raw wool waste and to review literature on actual and emerging solutions for converting raw wool waste into useful and profitable materials and products.

Key words: natural fibers, renewable resources, waste management, waste valorization, wool

Received: October, 2017; Revised final: February, 2018; Accepted: March, 2018

* Author to whom all correspondence should be addressed: smaier@ch.tuiasi.ro; Phone: +40 232 279850; Fax: +40 232 279850