

FUNGAL EXPLOITATION IN TEXTILE INDUSTRY

G.C.VARESE, A. ANASTASI, V. PRIGIONE, F. SPINA, V. TIGINI

Mycotheca Universitatis Taurinensis (MUT) – Department of Plant Biology – University of Turin (Italy) – Viale Mattioli, 25 – 10125 Turin Italy. cristina.varese@unito.it

The *Mycotheca Universitatis Taurinensis* (MUT) since several years collaborates with many small and medium enterprises (SMEs) involved in the textile and clothing sector (TCS) in Italy aimed to innovate and develop new eco-friendly processes and products with high knowledge content. The TCS in Italy is a strategic sector of our economy: has a turnover exceeding 40 billion € /year from approximately 67,000 SME, with over 500,000 employees, representing about 15-16% of the Italian manufacturing employment. The current market difficulties faced by the TC are determined by a number of adverse external factors, such as strong competition from emerging economies and the ups and downs in demand in addition to structural factors internal to SMEs, such as the high fragmentation of the industrial sector, the lack of strategic vision in the medium to long term, the inability to do research and to translate the results into processes and innovative products.

The TCS is a manufacturing sector characterized by high consumption of energy, water and chemicals. The European and national regulations are becoming more stringent. In particular there is a need to improve process efficiency in terms of energy and environmental sustainability according to the most stringent criteria in Directive 96/61/EC "Integrated Pollution Prevention and Control (IPPC), in the "Best Available Techniques for the Textile Industry (BAT)" and "European Communities (COM 122-2002), EU Water Framework Directive"

The enzymatic treatments are considered the new frontier of textile wet processing because they allow the development of industrial processes to comply with more stringent legislation on environment, health and safety (IPPC, REACH). The application of biological treatment of dyeing wastewater is an innovative approach in the prevention of pollution and development of purification systems to be installed at the foot of production cycles.

Consortia set up by textile companies, research centers and universities combine the scientific and technological skills enabling integration and cooperation for research programs aimed at innovation. In the TCS field, MUT took part in different consortia (BIOTEX, PURACQUA, GREENMADE) where companies were allowed to experiment and apply the best available techniques for: reduction emissions and pollution load of wastewater, use of less hazardous substances, reduced fuel consumption, recovery/recycling of process water, improving the efficiency energy processes. This overall objective has been pursued through three specific researches aimed at the development of: i) biocatalytic processes that apply to the preparation and finishing of textile substrates, replacing the traditional chemical processes; ii) bioactive textiles by immobilization of specific enzymes; iii) new technologies for the treatment of dyeing wastewater mainly based on the use of selected dead (biosorption) or alive (biodegradation) fungal biomasses.

Within these consortia, MUT has a key role through the screening of strains with specific characteristics such as high biosorption yields against specific pollutants or the production of enzymes with specific features such as thermostability. Once the fungi of interest have been selected, MUT supports the SMEs and other research centers in the industrial development process (i.e. medium engineering for the production of enzymes or physical and chemical pretreatments of the biomasses to increase their effectiveness in removing pollutant).

In conclusion MUT is one of the largest BRCs of microorganisms in Italy and maintains a wide collection of diverse fungi with the aim to explore and exploit their biotechnological potential in different fields of application.

Acknowledgements. We thank the BIOTEX, PURACQUA and GREENMADE Consortia for the financial support and the scientific collaboration.

INDICE