



### **Topic of the Speech:**

Comparative Analysis of Antibiotic and Antioxidant Activity of Raw Hemp and Flax Fibers

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**Dr. Malgorzata Zimniewska** is director of the Institute of Natural Fibres & Medicinal Plants. She graduated from Textile Faculty, Mechanical Technology of Fiber at the Technical University of Lodz. Her PhD Thesis was completed with honours at the Technical University of Łodz in 2006 and habilitation in 2016. She received a title of Assoc. Prof. of Institute of Natural Fibres & Medicinal Plants in 2011.

Malgorzata Zimniewska worked as Head of Department of Innovative Textile Technologies and the Laboratory of Physiological Influence of Textiles on Human Body at the Institute of Natural Fibres & Medicinal Plants. Her main area of interest is development of natural lignocellulosic fiber processing, technologies and evaluation, to meet the specific needs of different fiber applications. M. Zimniewska's favorite study is related to development of pro-healthy textiles with positive influence on human physiology and evaluation of their effect on the body. She also lead a research team working on bast fibers application to reinforce composites.

Malgorzata Zimniewska has been a Member of the Textile Institute since 1996 r., currently she is a Chair of Polish Section of Textile Institute. She serves as Vice Chair of Quality Control for European Commission in frame programme H2020, Research Executive Agency, Future and Emerging Technologies, Brussels 2018 – 2019. She served as a Chair of DNFI - Discover Natural Fibers Initiatives Network from 2013 to 2016, also as an Expert of Task Force on the Challenges from Competing Fibers of International Cotton Advisory Committee in USA, Expert of European Technology Platform for the Future of Textiles and Clothing EURATEX, and Expert of the National Centre for Research and Development in Poland.

Malgorzata Zimniewska has led many international, European and national projects.

She has authored and co-authored more than 150 articles published in research journals, conference proceedings and book chapters. She is a co-author of patents, which were awarded with 4 gold, one silver and one bronze medals at international innovation exhibitions and of President of Polish Chamber of Commerce Award KIG INNOVATICA 2010. She was also awarded with Silver Cross of Merit, 2010.

-For invited speaker only

### **Comparative Analysis of Antibiotic and Antioxidant Activity of Raw Hemp and Flax Fibers**

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#### **ABSTRACT (NO MORE THAN 500 WORDS:)**

This paper presents results of research aiming at investigation and comparison of antibiotic and antioxidant activity of the hemp and flax fibers in order to determine their functionality and safety for human skin. Decorticated, dew retted, water retted and osmotically degummed four varieties of hemp fibers as well as decorticated, wet degummed supported with ultrasound and cottonized three varieties of flax fibers were used as material for this research.

Antioxidant capacity of bast fibers was measured using two methods: FRAP - ferric ion reducing antioxidant parameter and DPPH radical reduction method.

In order to identify the compounds present in the fiber and to confirm the presence of phenolic acids: syringic, sinapinic, p-coumaric and ferulic acid in the tested hemp and flax fibers, spectrophotometric analysis was conducted by use of a total internal reflection method with an ATR attachment (Attenuated Total Reflectance). To determine the fiber antibiotic activity, MIC-Minimal Inhibitory Concentration for Staphylococcus aureus bacteria was evaluated.

The tested flax fibres showed higher antibacterial and antioxidant activity in comparison to the hemp fibres. The FRAP and DPPH parameters as well as the antibiotic units reached the highest values for both types of fibres extracted with the use of decortication method, however decorticated flax was additionally characterized with the best antibiotic activity among all tested fibers. The correlation between fibers bioactivity and their chemical composition was exhibited.

The highest ability to reduce Fe ions from Fe<sup>3+</sup> to Fe<sup>2+</sup> showed decorticated flax fibres of Modran variety. The subsequently applied processes caused reduction of the FRAP and DPPH values.

In the case of the Bialobrzesckie hemp extracted with use of different methods, the strongest correlation was found between the content of ferulic / syringic / sinapinic acids and values of the FRAP and DPPH as well as of lignin. The highest values of the Pearson correlation coefficient calculated for different varieties of hemp was observed for relationship between the ferulic acid and DPPH, p-coumaric acid and lignin content and the FRAP as well as for the sinapinic acid and DPPH and FRAP.

The results of the study proved that flax and hemp fibres exhibit inherent antioxidant and antibiotic activity, diversity of which depends on the plant variety, method of fibre extraction and subsequent stages of the technological chain applied for the fibre processing.