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Optimizing flax fibers for tomorrow's therapeutics

Flax fiber served as a major source to manufacture textiles, whereas seeds were pressed to extract edible oil. In the last decades devaluation of flax fiber in the world has been observed. Recently, the renewed interest in flax products has been noticed due to better understanding of the genes involved in flax productivity and fiber quality. All these provide targets for fiber improvement by the novel genetic/epigenetic methods leading to more diverse products based on flax fibers. For example manipulation of gene expression significantly increases antioxidant potential, affected lignin and pectin synthesis and cell wall arrangement. Up-regulation of β -glucanase gene protects plant against pathogenic infection, and thus increases fiber productivity and quality. Unique flax fiber was obtained, by genetic engineering, with novel constituent that strongly affects fiber properties and application, for example the production of a polyhydroxybutyrate (PHB) which was accomplished by simultaneous expression of three bacterial genes under vascular bundles specific promoter. The unique application of PHB-fibers has been shown in chronic wound healing. Pre-clinical study revealed healing improvement of chronic ulcers upon treatment with wound dressing based on new fibers. The healing effect was potentiated by supplementation of PHB-fibers with two activators derived from seeds and seedcake of flax accumulating antioxidant compounds. Up-regulation of antioxidants was achieved by simultaneous expression of three genes from flavonoid pathway. The PHB-fiber embedded in polylactide may serve as a scaffold for tissue engineering and has been shown to be useful as biodegradable implant. Micronization process can introduce structural changes in fibers constituents to exhibit more functional groups, and thus might potentiate fiber functionality. Indeed, highly reactive micronized flax fibers might serve as a carrier for biologically active compounds.

Biography

Jan Szopa is currently working as a Professor in the Department of Biochemistry and Genetics at the University of Wroclaw, Poland. His international experience includes various programs, contributions and participation in different countries for diverse fields of study. His research interests reflect wide range of publications in various national and international journals.

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