



Environmental Biotechnology

## Byproducts as sources of phenolic compounds for functional textiles

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**Introduction:** The textile industry is a major global source of pollution due to its high use of energy, water and chemicals. Thus, a need has risen to move the textile industry towards a more sustainable economy. The eco-safety awareness and increased environmental concern has led to the use of green and sustainable natural dyes as the needed trend within this industry. Wastes/byproducts from the agri-food industry can serve as a natural source of functional dyes rich in phenolic compounds, being both cheap and abundant while also aiding in the reduction of waste. The main objective of this work was to study different byproducts for their potential to be used in the textile industry as functional dyes. **Methodology:** Two different green and sustainable extraction methodologies were used in four byproducts (hops, carqueja stem, lemongrass and peanut skin) from the agri-food industry. One aqueous (100% H<sub>2</sub>O) and one hydroethanolic (70% EtOH). All extracts were characterized regarding their sugar, phenolic and flavonoid content, as well as their biological potential as antioxidants and antimicrobials. Their cytotoxicity was also evaluated against a skin cell line. **Results:** The aqueous extracts showed the highest quantity of total sugars. With the exception of hops, hydroethanolic extracts showed higher total phenolic content than the aqueous extracts, with the peanut skin extract showing the highest amount (313,1 ± 6,7 mg GAE/g of extract). The hydroethanolic extract of lemongrass had the highest amount of total flavonoid content (202,9 ± 3,1 mg CAE/g of extract) as well as the highest antioxidant activity (6279,1 μmol TE/ g extract). As for antimicrobial activity, hops extracts were able to inhibit the growth of *S. aureus* at 20 mg/mL, while no extract was able to inhibit gram-negative bacteria (*E. coli* or *P. aeruginosa*). All extracts showed some cytotoxicity against HaCaT cells except for the hops extracts at 5 mg/mL. **Conclusions:** While more studies are necessary, the results show that by-products from the agri-food industry have great potential to be used as functional dyes in the textile industry.

**Key words:** Textile industry, byproducts, phenolic compounds, flavonoids, antioxidant activity.