# PHYSICOCHEMICAL COMPARISON OF CHITIN AND CHITOSAN OBTAINED FROM TWO MUSHROOM SPECIES (*BOLETUS BOVINUS* AND *LACCARIA LACCATA*)

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Chitin is the second most plenteous polysaccharide in nature after cellulose, present as supporting material in exoskeletons of insects, crustacean shells and in the cell wall of mushrooms. The lack of solubility of chitin makes it necessary to modify the molecule for most of its applications. It is known that chitins and chitosans from different sources exhibit different physicochemical properties and these different properties expand the application area of these biomaterials. The aim of present study was to determine and to compare physicochemical properties of chitin and chitosan from two mushroom species (*Boletus bovinus* and *Laccaria laccata*).

Chitin was obtained from the cell wall of two different mushroom species using chemical method which included following steps: 1 – glucan extraction, 2 – demineralization in solution of hydrochloric acid to remove inorganic compounds, 3 – deproteinization in solution of sodium hydroxide, 4 – depigmentation and bleaching. For chitosan production the chitin samples were refluxed with 60 % NaOH at 130 °C for 4 hours under a $N_2$ atmosphere. The chitins and chitosans were characterized by attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR), elemental analyses (EA), nuclear magnetic resonance spectroscopy (NMR), thermogravimetric analyses (TGA) and X-ray diffraction (XRD).

The dry weight chitin contents of the mushroom species were determined as 8.5 % for *L. laccata* and 6.2 % for *B. bovinus*. Chitosan yields of the chitins isolated from *B. bovinus* and *L. laccata* were 70.9 % and 64.3 %, respectively. ATR-FTIR spectra analysis demonstrated the characteristic bands of the chitin and chitosan molecules. While, the maximum degradation temperatures of *B. bovinus* and *L. laccata* chitins were found to be 380 °C and 363 °C by TGA, the maximum degradation temperatures of *B. bovinus* and *L. laccata* chitosans were recorded as 317 °C and 309 °C, respectively. The crystallinity index values of *B. bovinus* and *L. laccata* chitins were calculated as 85 % and 78 %, respectively according to the X-ray diffraction analysis results. Degree of acetylation (DA) determined by EA and NMR was found to be 90±5 and 92±4 for chitin from *L. laccata*, 93±5 and 94±4 for chitin from *B. bovinus*, respectively.

Mushroom chitin demonstrated typical patterns of α-chitin with high acetylation degree, but the thermal stability of chitin from *L. laccata* was lower than from *B. bovinus*. The results of this study revealed that *L. laccata* had higher chitin content than *B. bovinus*, and these species may be used as a potential chitin source with appropriate physicochemical properties (chemical structure, thermal stability, crystallinity index, degree of acetylation) for possible biomedical application (for example, chitosan films).