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FTIR SPECTROSCOPY AS A PROCESS ANALYTICAL TECHNOLOGY TOOL FOR CHARACTERIZATION AND PREDICTION OF PERFORMANCE AND QUALITY PROPERTIES IN CULTIVATED MUSHROOMS

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Nowadays, there is an increasing number of Fourier transform infrared (FTIR) spectroscopy applications related with characterization and quality assessment of food products (e.g. milk, vegetables, wine). However, the use of FTIR, as a process analytical technology (PAT) tool in mushroom science and technology, is still very limited. So far, FTIR has been exploited for the discrimination/authentication of Amanita, Boletus, Leccinum, Lignosus and Wolfiporia fruitbodies or sclerotia on the basis of their geographic origin, for separation between wild and cultivated basidiomes of Ganoderma spp., and to identify different types of mushroom glucans. Furthermore, FTIR combined with multivariate analysis have been applied to assess the post-harvest physical damage and aging of Agaricus bisporus mushrooms, and to determine the storage stability of Ganoderma lucidum water extracts. During the last years, our research team has exploited the large fungal culture collection it maintains, in order to implement FTIR approaches in the taxonomy of basidiomycetes as well as in mushroom cultivation and product quality. Towards this end, diffuse reflectance absorbance FTIR (DRIFT) were successfully implemented to identify strains of the same species and to discriminate 16 taxa of the genus Pleurotus, thus providing a fast, reliable, and cost-efficient solution for identifying pure cultures to species. In addition, the same technique was applied for the spectroscopic characterization of substrates commonly used in the cultivation of Cyclocybe cylindracea, and a FTIR-model was developed to predict mushrooms biological efficiency by advanced chemometrics. Furthermore, attenuated total reflectance FTIR (ATR-FTIR) was used to characterize Pleurotus fruitbodies produced on various substrates, while models predicting the content of mushrooms in health-promoting bioactive compounds (e.g. β-glucans, ergosterol, phenolic compounds, amino acids) were developed, achieving high performance (R^2 higher than 0.8) and low error (in most of the cases lower than 10%).

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