A combination of electron microscopy with elemental analysis by the detection of the specific X-ray spectrum that is emitted by the examined sample offers a unique possibility to correlate ultrastructural features and the chemical composition of the specimen. The simultaneous mapping of four different elements – silicon, phosphorus, potassium and sulphur – was performed on a sample of a wild growing edible mushroom *Xerocomus badius*. A JEM 1200 EX (JEOL Ltd., Japan) equipped with the LINK AN10000 (UK) system for energy dispersive microanalysis was used. The unfixed material was prepared for analysis by dehydration in a critical point drying system (Polaron, UK) using liquid CO\(_2\). The structure of the sample was further analyzed using the ASID 10 scanning attachment of the microscope on the carbon-coated slices.

X-ray spectra were collected (within 0-10 keV) from an area of 125 µm x 125 µm of the specimen, and processed with the computer-assisted programs, Mapping-ADM-LINK 10000 and DIGIPAD. All four distribution maps of the analyzed elements were superimposed over the digital image of the sample. This enabled both the visualization and localization of the elements, as well as the semi-quantitative analysis of their content. The concentration of the analyzed elements throughout the whole fruiting body was examined. Concentrations were higher in the cap than in the stalk. The external part of the cap showed the presence of 4.13% silicon contrary to its internal part. The content of potassium was slightly higher (89.18%) in the external part of cap than in the internal part (84.61%), whereas the phosphorus and sulfur were distributed evenly. Co-localization of potassium, phosphorus and sulphur was detected in the cap’s hyphae. Such simultaneous mapping of several elements has the advantage of giving us both information on localization and semi-quantitative analysis.