

VARIATIONS OF SULPHUR AND METALLIC ELEMENTS IN LICHENS (*XANTHORIA PARIETINA*) IN THE DIFFERENT PARTS OF RIGA

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Lichens (*lichenes*) are symbiotic organisms which consist of two organic parts: fungi and algae or cyanobacteria. They are considered as one of the slowest growing plants with growth rate $1\text{--}30\text{ mm}\cdot\text{year}^{-1}$. Lichens absorb water and nutrients directly from air and therefore, they are sensitive to air pollution. Sulphur dioxide (SO_2), heavy and radioactive metallic elements are considered toxic which may negatively affect further development of lichens.

Lichens are widely used as bioindicators for monitoring the status of the environment, especially quality of the air. Air quality can be estimated not only by diversity of lichen species but also by their chemical composition. The more polluted the air is, the higher concentration of chemical elements will be found in the lichens.

(*Xanthoria parietina*) is foliose (leafy) lichen which can be found in wide geographical area. They often are spotted on tree branches and barks and belong to the one of durable lichen species whose growth is affected only by high air pollution level.

The aim of our research was to evaluate sulphur and metallic element content in foliose lichens (*Xanthoria parietina*) in the different parts of Riga. Lichens samples were collected on different tree species with similar bark structure $\sim 1\text{--}2\text{ m}$ above the ground. For the analyses had chosen three different locations:

1. Freeport of Riga, Kundzinsala;
2. Residential area, Sarkandaugava;
3. Mezaparks (green area of the city).

During the research it was important to evaluate the level of pollution in the Freeport of Riga. This area is characterized by intensive coal cargo transportation, both by ships and trucks. Therefore, high air pollution level in this area could significantly affect other neighbourhoods depending on wind direction. When analysing lichens, it was important to evaluate how far dust from the coal storage area could spread to adjacent areas.

Unwashed lichens were air-dried at $50\text{ }^\circ\text{C}$ for 24 h, homogenized and digested in the mixture of $\text{HNO}_3\text{:H}_2\text{O}_2$ using microwave assisted digestion method. Metallic element content in lichens was determined by ICP-MS analysis method but sulphur was determined as sulphate ions by turbidimetry.

The determined sulphur content in lichens in the territory of the Freeport of Riga is $\sim 5\text{--}7$ times higher than in other areas. The determined Ca, Mn, Fe and Cu content in lichens from the Freeport of Riga is ~ 2 times higher than Sarkandaugava and Mezaparks.

The content of sulphur and iron content in lichens that were sampled from the Freeport of Riga varies in a wide range, whereas in the territory of Mezaparks determined concentrations are quite similar.

There is observed tendency that As and Pb content in the analysed lichens decreases in the following order: Freeport of Riga \rightarrow residential area, Sarkandaugava \rightarrow Mezaparks.