Micromorphology of epicuticular waxes and cell wall chemical composition of aspen leaves (*Populus tremula*) from novel ecosystem habitats

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The cell wall is an integral, metabolically active part of the cell that responds dynamically to stimuli from within the cell or the environment.

The aim of this study was to analyze the micromorphology of epicuticular wax structures and the chemical composition of the cell wall of aspen (*Populus tremula*) leaves from a novel ecosystem (coal heap) and a control site. The plant material consisted of leaves of aspen, a common deciduous tree. It is a pioneer species with high ecological plasticity. Leaf epicuticular waxes were visualized using scanning electron microscopy (SEM) and characterized according to the classification of Barthlott et al. (1998). In order to determine the elemental composition of the samples, energy dispersive X-ray spectroscopy (EDS) was applied. In turn, cell wall components were labeled with monoclonal antibodies based on the immunohistochemical staining protocol of Paciorek et al. (2006).

As a result of the SEM study, various forms of waxes were observed on the surface of aspen leaves. Epicuticular wax in crusty form dominated the leaves from the coal heap, while crystalloids often obscured the crusty forms at the control site.

In turn, the immunohistochemical studies revealed differences in the localization of arabinogalactan proteins and low-esterified pectins in leaf cells of plants from disturbed habitats compared to control sites. The presence of arabinogalactan proteins was evident in leaves from individuals growing in novel ecosystem habitats, while they were absent at the control site. However, no significant differences in the localization of low-esterified pectins were observed.

An analysis of epicuticular waxes, as well as the immunohistochemical studies, can serve as an additional research method used to study the adaptability of plants to novel ecosystem habitats.

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References

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