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Book of Abstract

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Variability and relation of lignin, low molecular mass phenolics and cell wall bound peroxidases in the needles of Serbian spruce (*Picea omorika* (Pančić) Purkyně) during four seasons

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ABSTRACT

We studied seasonal variation in the activity and isoenzyme pattern of cell wall bound peroxidase, as well as contents of lignin and simple phenols ester and ether bonds to the cell wall, in the needles of *Picea omorika* (Pančić) Purkyně trees. The samples were collected from the natural habitat of the species, Mt. Tara. Seasonal changes were found to affect enzymatic activities and isoenzyme profiles. Several isoforms of both ionic and covalent peroxidase were detected. The highest ionic peroxidase activity was attained in summer, while the highest activity of covalent peroxidase was attained in spring. The highest lignin content was found in spring. A GC-MS analysis of cell wall alkaline extracts has shown the presence of ferulic acid, *p*-coumaric acid and coniferyl alcohol, as well as dehydroferulic acid dimers, ferulic acid-coniferyl alcohol dimers and coniferyl alcohol trimers. These results may be an evidence of more extensive cross-links among wall polymers in *P. omorika* species. HPLC determined contents of ferulic acid, *p*-coumaric acid and coniferyl alcohol, released from the alkali treated cell walls, were lowest in spring. The low values of these phenols in *P. omorika* needles in spring show that polymeric structures of cell wall are less interconnected, meaning higher relaxation and loosening of the cell wall. This may be related to increased vegetative growth in this season. It was found a positive correlation of individual phenols esterified to the cell walls with the activities of some ionic and covalent POD isoforms in annual cycle. These results support hypothesis that certain ionic and covalent POD isoforms might be involved in formation of the cross-links between cell wall polymers in Serbian spruce needles.