Effect of ozone fumigation on isoprene and methanol emission by the leaves of Grey poplar (*Populus x canescens*)

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Emission of isoprene from fully expanded leaves of Grey poplars exposed at short-term and acute (4 h at 170 ± 15 ppb) and long-term and chronic (7 h at 80 ± 15 ppb) ozone concentrations was investigated under laboratory controlled conditions. In parallel, meteorological and plant physiological parameters were determined. Leaves of poplar fumigated with acute ozone concentrations emitted significantly higher amounts of isoprene (35 nmol m^{-2} min^{-1}) compared to controls (18 nmol m^{-2} min^{-1}). Application of chronic ozone concentrations indicated no effect on isoprene emission rates. Photosynthesis and leaf stomatal conductance were significantly affected and decreased immediately after both chronic and acute ozone treatments. Furthermore, the lipid peroxidation of cellular membranes, as well as induced H_2O_2 concentrations, resulting from ozone exposure, dramatically increased in both treatments. The present findings do not provide any direct evidence to support the hypothesis that isoprene has an antioxidant role in plant biochemistry. In a further set of experiments, the relationships between methanol emission from poplar leaves and plant physiological and environmental parameters were determined. It was shown that emissions of methanol significantly increase with stomatal opening and leaf temperature. Moreover, it was demonstrated that methanol emission is strongly enhanced in poplar leaves suffering from oxidative stress induced by chronic and acute ozone exposures.

Key words: VOC, isoprene emission, methanol emission, ozone stress, Grey poplar, *Populus x canescens*.