

## ABSTRACT

The aim of this study was to measure ground-level ozone in České Švýcarsko National Park which is situated in the north of Bohemia to the frontier with Germany. No measurement of this kind has been made in this area so far. Space variability of concentrations of ground-level ozone was analysed as well as dependence of ground-level ozone concentration upon the elevation. Concentrations of ozone inside and outside of forest stands were compared and the accuracy of measurement by Ogawa samplers was analysed. The concentration of malonyldialdehyde in spruce needles of *Picea abies* was used as the indicator of fotooxidative stress.

Although České Švýcarsko National Park is situated in the area of former “Black Triangel“ - the territory which used to be under a heavy industrial stress, e.g. coal-fired power stations, opencast coal mining (Czech Republic -Ústecký district , south-east Germany) - this part of the territory was only influenced partially.

This study focuses on detecting of ozone concentration and its measuring by passive sampling. Ogawa passive samplers were used for measuring of 2week concentrations and 24hour concentrations were measured by Willems badges. Measurements by Ogawa samplers were realized at five sites: Nad Dolským Mlýnem Natural Monument, Rokle u Zadní vyhlídky, Stříbrné stěny, Loučka na Jedlině, Kuní vrch. These sites were evenly set out in the area of the National Park and the measurements were realized for six month period (May-October 2004). The measurement by Willems badges was realised during one 2week monitoring period at the end of August 2004.

The passive sampling is based on the principle of diffusion of gaseous pollutant and its absorption by a reactive component. At Ogawa samplers ozone oxidizes the nitrite on the pre-coated filter to nitrate and the filter extract is analyzed by ion chromatography. The concentration of nitrate measured on the filter is in proportion to the concentration of ground-level ozone which took part in the reaction. The method of Willems badges is based on oxidation of blue indigosulfonate (IDS) by ozone to colourless isatin. The concentration is derived from absorption measured by colorimetry.

No computerized monitoring station is situated in the area of České Švýcarsko National Park. That is why the dosimeter resistance  $R_t$  was taken over from measurements which were carried out by the identical passive sampling and were realized in the territory of the Czech Republic during the same vegetation period.

2week average concentration of ozone measured by Ogawa samplers in vegetation period of 2004 was  $59 \mu\text{g}\cdot\text{m}^{-3}$ . In comparison to the average values measured during the same vegetation period in the Novohradské Mts. ( $55 \mu\text{g}\cdot\text{m}^{-3}$ ) and in the Protected Landscape Area Orlické Mts. ( $90 \mu\text{g}\cdot\text{m}^{-3}$ ), Turkey-Kramer's test pointed out a significant difference of concentrations of ozone measured in the Orlické Mts. in comparison to the area of České Švýcarsko and Novohradské Mts.

No dependence on the elevation of the individual sites was detected from the 2week ozone concentrations measurements.

During the measurements by Willems badges for the fourteen day long monitoring period in August, the 24hour treshold value  $65 \mu\text{g}\cdot\text{m}^{-3}$ , which is determined for protection of vegetation and ecosystems, was exceeded in 20 cases (36 %). Measurements by Willems badges also recorded no statistically significant difference of ozone concentration at the sites in and outside of the forest stand. According to the comparison of the resultant values of concentration of nitrate measured on two filters which were set in one sampler, the quality of measuring by Ogawa samplers was evaluated as high. The resultant R.S.D. was 4.75%. Protection of Ogawa samplers for field measurement is sufficient even at unfavourable meteorological conditions as precipitation or fog.

The accuracy of measurement by Willems badges was analysed by comparing individual values of absorbances which were detected on three badges situated on one hold at one site. The resultant R.S.D. was 6.19% . If they are not protected sufficiently, Willems badges are not suitable for measuring during precipitation.

Within the context of specialized publications the extent of fotooxidative stress of vegetation indicated by concentration of malonyldialdehyde (MDA) in assimilatory organs was found weak. The average amount of MDA in one-year-old needles was  $4.62 \mu\text{mol}\cdot\text{g}^{-1}$

Recorded MDA values did not prove any dependence of MDA increase on elevation of the individual sites. As well, no relation was proved between the amount of MDA of the individual sites and the average 14day ozone concentrations recorded at these sites.