PERFORMANCE OF APHIDS ON NORWAY SPRUCE SEEDLINGS EXPOSED TO TRAFFIC EMISSIONS IN ROAD SIDES OR FUMIGATED WITH EXHAUST GAS UNDER LABORATORY CONDITIONS

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In order to evaluate urban pollution effects on conifers and their pest insects, Norway spruce *Picea abies* (L.) Karst seedlings were exposed to traffic emissions along two urban streets and a highway. The responses of the exposed seedlings as a host plant and those of spruce shoot aphid (*Cinara pilicornis* Hartig) were studied. In addition, in growth chambers suitable for pollutant fumigations, three-week exhaust gas exposure and subsequent performance of spruce shoot aphid were studied using realistic exposure regimes; 50, 100 and 200 ppb NO_x.

The black carbon and polyaromatic hydrocarbons (PAH) accumulated in moss bags indicating deposition of organic compounds on plants along the highway and urban street.

Seedling growth, the concentrations of soluble N and free amino acids, defence chemicals (total phenolics, monoterpenes) and epicuticular wax structure were analysed, and aphid performance was studied. Along the highway, street and at the local road control site the atmospheric concentrations of (BC) and NO_x were measured for one week during the experiment. Deposition of the polyaromatic hydrocarbons (PAH) was determined at all sites using moss bags. The NO_x concentrations along the highway and street showed great diurnal variation, but the average NO_x concentrations were relatively low. Thus no increase in N metabolism or growth of the exposed Norway spruce seedlings were found. Along the street the concentrations of many individual free amino acids, such as proline, as well as total amino acid concentrations were lower than at the corresponding control site. Thereby there was also no increase in spruce shoot aphid MRGR. The aphid reproduction however increased along the highway, which is suggested to be due to better microclimatical conditions at the exposure site or lack of natural enemies. No changes in defence chemicals (total phenolics, monoterpenes) relation to the traffic exposure were found. Instead the microclimatical conditions (temperature, sunlight irradiation) seemed to affect the total phenolics concentration. The epistomatal wax structure of needles was distinctively fused and aggregated along the highway and street. This might have effects on needle-feeding aphids. The cause of the injuries appears to be hydrocarbon deposition from the road traffic, which was detected with moss bags.

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