

Polycyclic Aromatic Hydrocarbons in Pine and Spruce Shoots - Temporal Trends and Spatial Distribution

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Abstract: In the framework of the German environmental specimen bank one-year old spruce shoots (*Picea abies*) and pine shoots (*Pinus sylvestris*) serve as bioindicators for the atmospheric pollution. Sampling is performed in two urbanized areas in western and eastern Germany (Warndt and Duebener Heide, respectively), and in seven different rural locations. Prior to archiving conifer shoots are continuously analyzed for a set of 17 individual polycyclic aromatic hydrocarbons (PAHs). The results from the two urbanized areas show that the atmospheric contamination with PAH has declined by about 75 % between 1985 and 2004 at Warndt and by about 85 % between 1991 and 2004 at Duebener Heide. However, Σ PAH concentrations stayed virtually constant at both locations since the end of the 1990s at levels of about 100 ng/g wet weight (ww). In spruce shoots from rural areas current concentrations of PAHs are significantly lower and vary between 8 and 61 ng/g ww. In all shoot samples the four low molecular aromatics phenanthrene, fluoranthene, pyrene, and chrysene dominate the pattern by contributing 60 to 90 % to Σ PAH. The group of high molecular weight aromatics is dominated by benzo[b+j+k]fluoranthene, especially in spruce shoots originating from greater altitudes remarkable amounts of six and seven ringed PAHs could be detected. Despite the strong decrease of PAH concentrations in urban areas patterns of aromatics remained nearly unchanged in the observation period 1985 to 2004.