



Leaves litter as an important VOC source in the atmosphere

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Litter decomposition has long been recognized as an important process in forest ecosystems, both for nutrient recycling and humus formation. In comparison, there are only a small number of studies to describe VOC emission from leaves litter into the atmosphere. For land ecosystems, the litter biomass is estimated to be $(5-80) \times 10^{15}$ g. Even for this reason alone it should be regarded as a potentially important VOC source in the atmosphere.

In this communication we report the results of qualitative and quantitative GC-MS investigations of VOC emitted into the gas phase from leaves litter of ten species of deciduous and coniferous trees. The list of identified substances contains more than 100 organic compounds of different classes: saturated and unsaturated aliphatic hydrocarbons, terpenes, aldehydes and ketones, alcohols and esters, sulfur- and chlorine-containing compounds. It was established that the qualitative composition of VOC emitted by leaves litter is species specific. Highly volatile oxygenated VOC (acetaldehyde, acetone, methanol, and ethanol) are probably secondary products of the activity of litter-destroying fungi. It was established, that a leaves litter contains great amounts of low volatile and non-volatile (but easy biodegradable) compounds: unsaturated aliphatic acids, polyols and carbohydrates. Hence, it is reasonable to include into the methodology of studying litter as a source of atmospheric VOC the determination of a store of these substances that can be precursors of OVOC formed during microbiological decomposition of "dead" plant material.

A combination of solid-phase microextraction (SPME) and gas chromatography was used for determining of VOC emission rates from leaves litter. According to our estimations, emission rate of terpene hydrocarbons from Scots pine, common spruce, and

European larch litter is on average $1.2 \pm 0.3 \mu\text{g}/(\text{g} \times \text{h})$ at 22°C .

Some data on litter biomass in different type of forests are reported. It is concluded that these data may be included into special models for VOC emission evaluation.

The previous results of a long-term field experiment of studying chemical changes in decomposition of Scots pine, common spruce, and two species of poplar litter are also reported.