FIRST EXPERIENCE WITH THE NEW TYPE OF THROUGHFALL COLLECTOR

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Since May 1993, chemical composition and fluxes of selected minor and trace elements in throughfall have been monitored at the sampling locality Truba near Kostelec n. Č. lesy, Central Bohemia (Skřivan *et al.* 1995). Cumulative samples of throughfall have been collected in a mixed forest site into a set of nine sampling devices evenly distributed on a 20 m x 20 m square measurement plot. Samples have been collected in a polyethylene (PE) "VOSS" devices, shown in Fig.1, on a monthly basis. The collectors consist of a PE funnel (11.8 cm in diameter) with a zig-zag adapted upper edge (to prevent birds from sitting down on them and spilling the samples with their droppings). The funnels are equipped with a nylon sieve and screwed to 1L PE bottle.

According to our experience, these simple collectors posess two main disadvantages:

I - they do not prevent falling leaves and other solid parts of the vegetation into the collecting funnel. This material is then leached with the subsequent precipitation events which increases the concentration of the leachable elements and causes the positive error of the determination.

II- the hydrophobic (PE) surface of the funnel attaches a considerable portion of the solid particles of the atmospheric aerosol representing an integral part of the cumulative samples of throughfall. The attached particles are then washed-out at the end of the individual sampling period and they never enter the collected sample, thus causing a negative error of the determination.

To avoid these disadvantages, new type of throughfall collector ("*GCTC*", *Glass Cone Throughfall Collector*) was constructed and tested (Fig. 2). Glass conical bulb A, playing the role of an impact target of the

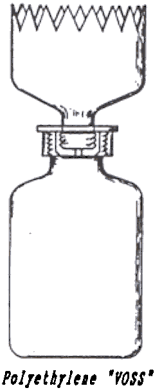

Fig.1: Polyethylene "VOSS" collector

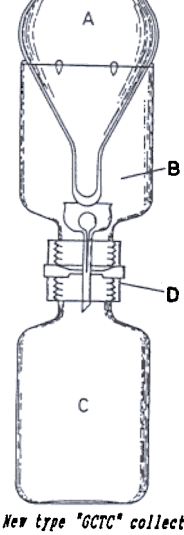

Fig.2: New type "GCTC" collector

throughfall drops, represents the main innovative element of the collector. The bulb is placed onto a cylindrical PE holder B where it is held on six small PE hooks turned down into the cylinder. Drops of throughfall caught on the conical part of the bulb flow down on its surface and enter the inner space of the holder through a narrow gap between these parts of the device. The liquid sample then flows into the collecting vessel C through the double screw cap D equipped with small glass funnel. The pipe of the funnel is sealed with a glass hollow ball (1.5 cm diameter) which automatically opens when water is pouring in. This construction enables leaves and other solid objects to slip down outside the PE holder and it therefore significantly reduces the possibility of contamination of the collected liquid. It prevents also birds to sit on the upper part of the collector. The smooth hydrophilic surface of the glass cone minimizes the losses of solid particles of the atmospheric aerosol through their attachement to the surface of the cone. Another advantage of the GCTC collector follows from the fact, that it collects the wet atmospheric precipitation in liquid state only. Wet precipitation in a solid state (snow, hailstones, hoarfrost) which doesn't chemically interact with the above-ground parts of the vegetation is - thanks to the construction characteristics of the collector - held outside the collecting vessel.

To compare the characteristics of the two types of collectors, table 1. summarizes the arithmetic mean concentration of the selected elements evaluated from samples collected in a set of 8 collectors (4 of them being the type "VOSS", 4 of the type "GCTC") placed in a 10 m x 10 m square measurement plot under the beech (Fagus sylvatica L.) canopy.

Table 1. Volume weight mean concentration of selected elements sampled through two different types of collectors since April till June 1996.

sampling period	collector No.	type	Vol. wt. mean conc. of element (ppb) Cd	Cu	Mn	Pb	Sr	Zn
4/96	1 - 4	VOSS	0.83	2.87	115	4.22	5.14	30
	5 - 8	GCTC	1.73	7.36	81	7.51	7.67	58
5/96	1 - 4	VOSS	0.40	2.35	153	1.25	5.54	7
	5 - 8	GCTC	0.48	3.25	91	2.08	3.73	11
6/96	1 - 4	VOSS	0.11	0.77	168	1.70	4.41	6
	5 - 8	GCTC	0.13	2.12	119	1.74	3.22	11

Mean concentration values presented in Tab. 1 show apparent differences in the individual elements, permanently occuring throughout the evaluated sampling periods: concentration of Mn, whose considerable content in throughfall follows mainly from the ion exchange of the tree metabolic products which takes place on the surface of their assimilation organs (Heinrichs, Mayer 1980, Atteia, Dambrine 1993), is always higher in the "VOSS" collector (which functions as a trap for the falling organic material). On the other hand, substantial source of the remaining elements must be found in the solid particles of the atmospheric aerosol which is caught to a considerable extent in the PE funnels of the "VOSS" collector. This is probably the reason why the collector "GCTC" provides higher concentration values in Cd, Cu, Pb, and Zn. Differences in the concentration of Sr are ambiguous, which can be explained by comparable extent of both the main sources of Sr in throughfall: through leaching of metabolites and through deposition of atmospheric aerosol.

References

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