



Evaluation of sampling and sample preparation methodologies for multi-elemental analysis in foliage samples

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Several approaches exist in literature for sample collection, preparation, and quantification of mercury concentration in foliage samples. Comparability of results from studies with varying methodological approaches are therefore critical for accurate estimation of vegetation control on Hg intercompartmental exchanges. To this end, field visits were carried out for the collection of foliar samples of *Carpinus betulus* in two forest sites in Slovenia having contrasting Hg source (Ljubljana as urban site and Idrija as Hg contaminated site). Foliage samples collected from different locations on the tree crown were then prepared to test the effect of washing on overall Hg foliar content. Each sample was then allowed to dry using selected procedures during their preparation for the determination of Hg content using ICP-QQQ-MS. Results show that the effect of sample treatment procedures on mercury concentration in foliar samples exhibit contrasting pattern with varying Hg source. Whereas the effect of washing was not evident on foliar samples collected from Ljubljana at mean Hg concentration of $9.85 \pm 2.21 \text{ ng g}^{-1}$, washing of foliar samples significantly decreased Hg concentration in foliar samples from Idrija (washed: $254.26 \pm 120.30 \text{ ng g}^{-1}$, unwashed: $392.94 \pm 210.47 \text{ ng g}^{-1}$, $p=0.028$). Variation in foliar Hg concentration within tree crown was evident both in Ljubljana (upper: $8.50 \pm 1.16 \text{ ng g}^{-1}$, outer: $8.85 \pm 1.93 \text{ ng g}^{-1}$, inner: $12.28 \pm 1.04 \text{ ng g}^{-1}$, $p=0.005$) as well as in samples from Idrija (upper: $239.32 \pm 201.76 \text{ ng g}^{-1}$, outer: $390.62 \pm 208.40 \text{ ng g}^{-1}$, inner: $336.30 \pm 85.70 \text{ ng g}^{-1}$, $p=0.04$) with mean concentration of $322.34 \pm 184.18 \text{ ng g}^{-1}$, several folds higher than those reported in foliar samples from Ljubljana. Overall, different drying procedures did not cause significant change in foliar Hg concentration from Ljubljana however, foliar samples from Idrija that were dried in the oven at 60°C had lower Hg concentration possibly indicating Hg loss during the drying procedure. Our results demonstrate that the choice of sampling and sample preparation methodologies for determination of foliar Hg concentration are strongly influenced by the presence of Hg source in the studied area which is critical consideration for future studies.