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STRATEGIES FOR ON-SITE DETERMINATION OF TRACE ELEMENTS IN OFFICINAL PLANTS BY STRIPPING VOLTAMMETRY

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Data from the World Health Organization show that a large part of the world population relies on traditional herbal medicine systems. However, the mistaken belief that medicinal plants are completely harmless and safe is also widespread. Indeed, there may be different risks for human health, due to the intrinsic toxicity of the plant, due to the presence of harmful compounds, its extrinsic toxicity, and foreign substances that may be present in the plant drug because of contamination, *e.g.*, by pesticides, micotoxins ,and heavy metals [1].

In the present work, Cu and Pb were determined simultaneously in three different samples of passionflower (Passiflora incarnata L.), a medicinal plant with mild sedative and anxiolytic properties, by Differential Pulse Anodic Stripping Voltammetry (DPASV) using a Glassy Carbon Electrode modified with a Mercury Film (MF-GCE) [2]. A portable voltammetric analyzer was used, suitable for both laboratory and field analyses. Firstly, the repeatability, accuracy, and linearity of the technique were tested in standard solutions. Then, two herbal tea cuts marketed by different companies and a hydroalcoholic solution of passionflower were analysed. Two approaches were adopted for mineralization: microwave oven digestion (only suitable for laboratory use) and heating in a small food warmer (suitable for field analysis); the subsequent voltammetric analyses provided comparable results for the first herbal tea sample, while, in the case of the second one, a difference between Pb content determined after using microwave digester and the food warmer was observed. This behaviour is probably due to the fact that Pb was partially bound with the undissolved residues left after digestion carried out in the food warmer. For this reason its value was underestimated. Furthermore, the results showed that Pb was below the legal limits (3 mg/kg) set by EU in all samples; no limit values are imposed for Cu. Finally, both metals were below the detection limits in the hydroalcoholic solution.

A comparison between the analyses performed in the laboratory and those carried out in field showed that the values obtained for Cu were comparable, while for Pb improvements on the extracting procedure are still needed, whereas the voltametric analysis in field seems to be reliable. The main advantage of on-site analyses is the availability of data in real time, which offers the possibility of choosing further sampling points based on the results just obtained and reducing the number of samples requiring additional investigations in the laboratory. References

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