

Trace Elements in Yerba Mate from Brazil and Argentina by Inductively Coupled Plasma Mass Spectrometry

Authors : F. V. Matta, C. M. Donnelly, M. B. Jaafar, N. I. Ward

Abstract : 'Yerba Mate' (*Ilex paraguariensis*) is a native plant from South America with the main producers being Argentina and Brazil. 'Mate' is widely consumed in Argentina, Brazil, Uruguay and Paraguay. The most popular format is as an infusion made from dried leaves of a traditional cup, roasted material in tea bags or iced tea infusions. There are many alleged health benefits resulted from mate consumption, even though there is a lack of conclusive research published in the international literature. The main objective of this study was to develop and evaluate the sample preparation and instrumental analysis stages involved in the determination of trace elements in yerba mate using inductively coupled plasma mass spectrometry (ICP-MS). Specific details on the methods of sample digestion, validation of the ICP-MS analysis especially for polyatomic ion correction and matrix effects associated with the complex medium of mate will be presented. More importantly, mate produced in Brazil and Argentina, is subject to different soil conditions, methods of cultivation and production, especially for loose leaves and tea bags. The highest concentrations for loose mate leaf were for (mg/kg, dry weight): aluminium (253.6 - 506.9 for Brazil (Bra), 230.0 - 541.8 for Argentina (Arg), respectively), manganese (378.3 - 762.6 Bra; 440.8 - 879.9 Arg), iron (32.5 - 85.7 Bra; 28.2 - 132.9 Arg), zinc (28.2 - 91.1 Bra; 39.1 - 92.3 Arg), nickel (2.2 - 4.3 Bra; 2.9 - 10.8 Arg) and copper (4.8 - 9.1 Bra; 4.3 - 9.2 Arg), with lower levels of chromium, cobalt, selenium, molybdenum, cadmium, lead and arsenic. Elemental levels of mate leaf consumed in tea bags were found to be higher, mainly due to only using leaf material (as opposed to leaf and twig for loose packed product). Further implications of the way of consuming yerba mate will be presented, including different infusion methods in Brazil and Argentina. This research provides for the first time an extensive evaluation of mate products from both countries and the possible implications of specific trace elements, especially Mn, Fe, Se, Cu and Zn and the various health claims of consuming yerba mate.

Keywords : beverage analysis, ICP-MS, trace elements, yerba mate

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