

ASSESSMENT OF METALIC POLLUTION IN SÃO PAULO CITY, BRAZIL, EMPLOYING TILLANDSIA USNEOIDES L. AS BIOMONITOR

A. M. G. FIGUEIREDO*, C. A. NOGUEIRA*, M. DOMINGOS, M. SAIKI***

*Neutron Activation Analysis Laboratory, IPEN-CNEN/SP, Av. Prof. Lineu Prestes 2242,
CEP 05508-000, São Paulo, SP, Brazil

**Botanic Institute, Av. Miguel Stefano No. 3687, CEP 01061-970, São Paulo, SP, Brazil
e-mail: grafigue@curiango.ipen.br

São Paulo is the biggest city in South America with a population of 18 million people, with about 8 000 km² and a strong industrial activity. The urban area is polluted by industrial emissions, but according to the Environmental Protection Agency of the State of São Paulo (CETESB), the governmental agency of air quality control, emissions from about 5.5 million motor vehicles daily are the main sources of air pollution. In this work, metal atmospheric pollution was evaluated in ten sites of São Paulo city submitted to different sources of air pollution (industrial, vehicular) by using the epiphytic bromeliad *Tillandsia usneoides* L. as biomonitor. This species grows on trees or other kind of inert substrates and absorbs water and nutrients directly from the environment. The samples of *Tillandsia usneoides* L. were collected in a non-polluted area, 80 km far from São Paulo city, and were transplanted to the monitoring sites. Samples were exposed for two months and after this period were substituted for new plants. This procedure was performed for 12 months, from June/02 to June/03. The exposed samples

and a control sample (from the non-polluted area) were dried, homogenized, ground and analyzed by using Instrumental Neutron Activation Analysis (INAA). The concentrations of 25 elements were determined. The results obtained showed a tendency of increasing concentration of elements As, Ba, Co, Cr, Sb e Zn in the samples of *Tillandsia usneoides* exposed in sites of São Paulo city with increasing degrees of pollution. Seasonal and temporal variations in elemental concentrations were statistically evaluated and factor analysis was used to identify pollution sources. Cluster analysis of the results obtained showed two groups of elements: one with Cr, Zn, Co and Ba, and the other with Ca, Fe, Rb and K. The elements Ba and Zn can be associated to vehicular sources, since Zn is used in lubricant oils and Ba in diesel. In fact, a higher concentration of Ba was observed in sites close to heavy traffic highways. On the other hand, higher concentrations of Co and Zn were obtained in sites located in industrial areas. The elements Ca, Fe, Rb and K may be considered lithophile or soil derived elements.

10412