ASSESSING LITTLELEAF LINDEN (*TILIA CORDATA)* AND NORWAY MAPLE (*ACER PLATANOIDES)* LEAVES AS MEDIA FOR MONITORING HEAVY METAL AIR POLLUTION IN WINDSOR, ONTARIO, CANADA

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Background and Aims: Epidemiological studies have shown correlations between traffic-related and other air pollutants and medical conditions [1-3]. Health agencies routinely rely on a limited number of fixed active and passive monitoring devices to measure regional/local air quality over fixed times. Increasing the number of monitoring sites is beneficial yet cost prohibitive (equipment, personnel and analytical costs); novel monitoring strategies are required. We investigated Littleleaf Linden and Norway Maple leaves in Windsor, an industrial border city in southwestern Ontario, Canada, sharing the world's busiest trade route with industrial neighbour, Detroit, Michigan, U.S., as potential air quality monitors for heavy metals near roads with varying traffic/industrial sources.
Methods: Co-located trees were allocated using a geospatial random stratified approach: traffic counts, road type and a buffered distance of 200 m were the main selection criteria. Leaves were collected from these trees over eight two-week periods in 2010. Thirty-eight elements were analyzed using ICP-MS; 11, using ICP-OES. NIST standards were used for QA/QC. EDAX-SEM was used for forensic validation of particle composition of ICP-MS and ICP-OES analytics.
Results: At two expressway sites, Sr concentrations up to 2,000 ppm were observed. These leaves were placed under the EDAX-SEM; angular mineral fragments were found to contain K, Sr, Ca and Si. At three sites, concentrations of Pb up to 1.2ppm and Fe up to 350ppm were observed. Under the microscope, spherical, striated particles containing Pb, Fe, and Ni, potentially indicate a steel manufacturing source [4]. At the expressway and a residential area, concentrations of Ni up to 60ppm and Mo up to 30ppm were observed. Under the microscope, spherical particles indicated Mo, Ni and Co, potentially a localized mobile source.
Conclusions: In the pilot study, leaves from Littleleaf Linden and Norway Maple proved highly effective air quality monitors for heavy metals in Windsor, Ontario and effective media for elemental forensic analyses.
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