

Title	Date palm (<i>Phoenix dactylifera</i> L.) leaves as biomonitors of atmospheric metal pollution in arid and semi-arid environments
Author	Omar Ali Al-Khashman, Ala'a H. Al-Muhtaseb, Khalid A. Ibrahim
Journal	Environmental Pollution, Vol. 159(6)
Abstract	<p>"The leaves of date palms were evaluated as a possible biomonitor of heavy metal contamination in Ma'an city, Jordan. Concentrations of (Fe), (Pb), (Zn), (Cu), (Ni), and (Cr) were determined in washed and unwashed leaves and soil samples collected from different sites with different degrees of metal contamination (urban, suburban, industrial, highway and rural sites); separate leaves were taken from outside the city to be used as a control sample. Samples collected from industrial sites were found to have high concentrations of all metals except those of Cu, Ni and Pb, which were found at high levels in the highway site samples which is associated with the road traffic. The difference between unwashed and washed samples showed that metal pollutants exist as contaminants, particularly Pb, Zn and Ni, which varied in concentration, depending on the source of the metal.</p> <p>Highlights</p> <p>High metal concentration in plant samples and roadside soil was due to the heavy traffic. The mean concentrations (C) were in the order: $C_{Fe} > C_{Pb} > C_{Zn} > C_{Ni} > C_{Cu} > C_{Cr}$. Difference between unwashed and washed samples showed that pollutants exist as contaminants.</p>
Year	2011
Pages	1635- 1640
keywords	

Title	Air quality biomonitoring in agricultural areas nearby to urban and industrial emission sources in Córdoba province, Argentina, employing the bioindicator <i>Tillandsia capillaris</i>
Author	J.H. Rodriguez, S.B. Weller, E.D. Wannaz, A. Klumpp, M.L. Pignata
Journal	Ecological Indicators, Vol. 11(6)
Abstract	<p>The air quality in agricultural areas close to industrial emission sources (chemical, metallurgical and cement plant) was evaluated through a biomonitoring study employing the epiphytic species <i>Tillandsia capillaries</i> Ruíz and Pav. f. <i>capillaries</i>. Plants were collected from a non-contaminated area in the province of Córdoba (reference site) and transplanted back to this site and into three industrial areas representing different emission sources of air pollutants: cement plant, chemical and metallurgical industries. Biomonitors were exposed to ambient air for four periods of 3 months each during one year (for determination of physiological parameters) and for four periods of 6 months each during two years (for determination of trace elements). In the exposure period coinciding with the winter season (i.e., the dry season) the plants showed the strongest global physiological damage, possibly due to higher air pollutant concentrations. The comparison among study areas indicates the highest values of foliar damage index at the chemical industries sites,</p>

	<p>possibly due to the emission of oxidizing pollutants. On the other hand, heavy metals and trace element concentrations (V, Fe, Co, Cu, Br, Ni, Zn and Pb) were associated mainly with metallurgical industries, although the chemical industries and the cement plant were associated with Ni, Zn and Ca accumulation in the biomonitor, respectively. Considering that these sites with high industrial activity are located close to soybean producing areas, further environmental and toxicological studies are necessary, taking into account food safety and human health.</p> <p>Highlights The foliar damage was associated with the chemical industries exposure sites. The heavy metal accumulation was related to metallurgical industries sites. The winter exposure period indicated the highest physiological damage. The results indicate a low air quality in agricultural areas nearby industries.</p>
Year	2011
Pages	1673- 1680
keywords	" <i>Tillandsia capillaries</i> ; Trace elements; Foliar damage index; Córdoba

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keywords	Date palm leaves; Heavy metals ; Atmospheric deposition; Biomonitoring; Arid environment