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Lead Contamination Levels in Roadside Vegetation of Tripoli Area, Libya

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There is increasing concern regarding environmental pollution due to lead contamination for the past few decades and its effects on human health are well documented (Harrison and Laxen 1981; Smith 1981; WHO 1972). The major source of lead contamination in urban areas is combustion of leaded gasoline by automobiles and the release of lead particulates through exhaust. Consequently there is ample of evidence in the literature showing the presence of elevated levels of lead in the roadside vegetation and soils (Ward et al. 1977; Fergusson et al. 1980; Graham and Kalman 1974; Little and Wiffen 1977).

Tripoli being one of the cities with large number of automobiles on the road with enormous consumption of gasoline and expected to increase with growing population is of concern to human health. In Libya lead additives are added at the rate of 0.5 to 0.6 g/l (Rashid 1985). As there is no information available regarding lead contamination levels in Tripoli area the present study was undertaken to determine lead content in roadside vegetation at different locations covering the city.

MATERIALS AND METHODS

Samples of roadside vegetation with distances ranging from 1 m to 10 m from the main roads (leaves from small bushes, gardens and grass) were collected in plastic bags from 12 different locations in Tripoli area covering major portion of the city. These pasture samples were then divided into unwashed and washed portions for analysis. Washing was carried out with about 20 litres running water by slow agitation to remove the surface dust. Both

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the samples (10 g) were oven dried at 150°C for 2 hr and ashed by using muffle furnace at 450°C for 4 hr. They were cooled over night in desiccator in the presence of calcium chloride. The dry weight of the samples was noted, the ash was dissolved in 2 M hydrochloric acid and filtered through Whatman No. 50 filter paper to make-up the volume to 50 ml. All the solutions were analysed by using Varian AA 1475 Atomic absorption spectrometer by using wavelength of 210 nm. The solutions of known concentrations of lead nitrate were used as standards. The blank solution was prepared as the same way without having the plant material.

RESULTS AND DISCUSSION

Mean values of lead levels in unwashed and washed vegetation samples at different locations are shown in Table 1.

Table 1. Mean lead concentrations in roadside vegetation at different locations in Tripoli area.

Location	Mean Value (µg/g dry wt)	
	Unwashed sample	Washed sample
Gargarish garden	43	21
Gargarish gas st No.9	124	47
Maidan Tahreer garden	164	110
Bab Al Bahar Madina	58	21
Green square garden	69	34
Gazala garden	68	29
Shath road	115	65
Abdus SalamArif garden	98	39
Dahra garden	134	67
Jamahiriya St	175	115
Gurji garden	118	73
Gurji street	717	260
Overall Mean Value	138*	65
SD	162.6	64.4
n=36		

* Significantly higher than the overall mean value of Washed samples ($p < 0.05$)

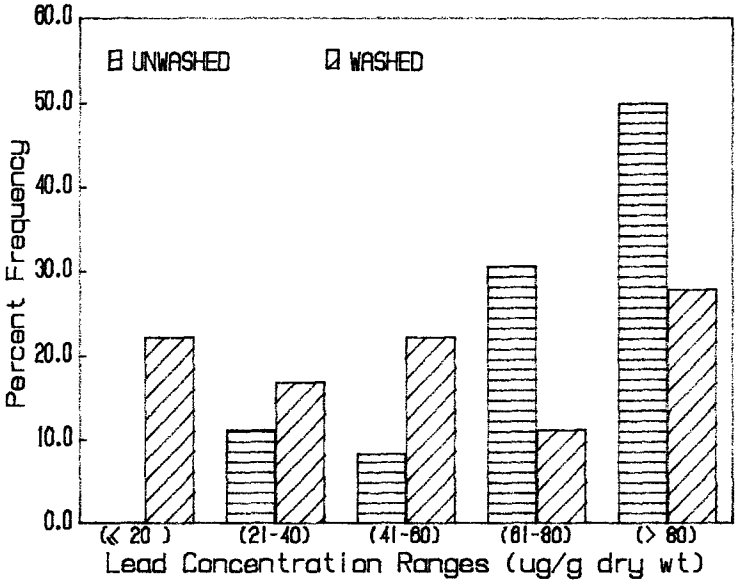

Figure 1. Percent frequency distribution of lead concentrations in roadside vegetation of Tripoli area.

The amounts ranged from 43 to 717 μg/g dry wt for unwashed samples whereas they varied from 21 to 260 μg/g dry wt for washed samples. The overall mean value of unwashed samples (138 μg/g dry wt) was significantly ($p<0.05$) higher than that of washed samples mean (65 μg/g dry wt) suggesting that the source of elevated lead contamination is mainly due to deposited lead which is derived from automotive emissions. The overall mean values are comparable with that of observations reported at Auckland (Ward et al. 1977). The percent frequency distribution of all the observed amounts are presented in Fig 1. Higher percent of values for unwashed samples were distributed in class > 80 μg/ g dry wt whereas a reverse trend was noted for washed samples i.e most of the values falling in classes < 40 μg/ g dry wt which confirms the suggestion that the most of the contamination is apparently from the accumulated lead. Among the observed data elevated levels were seen at places with high traffic density which also suggests that the accumulated lead is from automotive emissions and in agreement with proposition of correlation of

lead levels with traffic density by others (Rodriguez and Castellon 1982; Ward et al. 1977). The presence of elevated levels of lead on/in the plants closer to the roads with high traffic density suggests that some necessary steps should be adopted to reduce lead pollution in the city.

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