RESEARCH PAPER:

A preliminary assessment of the heavy metals around two municipal solid waste (MSW) dumpsites

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SUMMARY

Heavy metals and physico-chemical characteristics of the different sites of the municipal solid waste dumpsite at two Municipal Solid Wastes (MSW) dumpsites, Alexandria, Egypt were investigated. The levels of heavy metals were measured at different sites with different distances and directions from two dumpsites in Alexandria for the ambient air and soil. The results indicated a steady decrease in the concentrations of total Cd, Cu, Ni, Cr and Zn in the ambient air at Abis area with distance from the municipal solid waste (MSW) dumpsite. The mean maximum recorded levels were 1.43, 2.95, 2.71, and 2.95 and 2.35 «g m^{-3} for Cd, Cu, Ni, Cr and Zn, respectively, while the minimum levels were 0.10, 0.32, 0.41, 0.30 and 2.10 «g m^{-3}, respectively in Abis area. Similar trends were found at El-Montaza district. Levels of heavy metals in soil were measured in 19 sites near and around the old (MSW) dumpsite at four directions. It was found that the sites located in the southeast direction from (MSW) dumpsite had the highest levels of total metals in soils. The soil of site closed to the (MSN) dumpsite at Abis contained the highest levels of total metals which were 4.90, 95.20, 11.80, 10.20 and 110.0 ìg g^{-1} for Cd, Cu, Ni, Cr and Zn, respectively. Similar trend was found at El-Montaza district.

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Atmospheric pollution is of a major public health concerns in many large cities worldwide. However, in many cases only a little attention has been given to this issue in developing countries. Example is the case of Alexandria city in Egypt where two municipal solid waste (MSW) dumpsites were located at the east and west directions of the city. One of the main activities leading to this problem included deposition of compost and incineration of MSW, which contained high levels of heavy metals. Such activities tend to increase the elemental background levels in the surrounding agricultural land driving to adverse temporal and/or spatial variations of heavy metals levels in soils.

Atmospheric deposition of anthropogenic derived chemicals is an important source of environmental pollution. It contributes to the load of pollutants in urban runoff (James *et al.*,1990; Jaffe *et al.*, 1993).

Municipal Solid Waste management depends on the characteristic of the solid waste including the gross composition, moisture contents, average particle size, chemical composition and density, in which knowledge of these, usually helps in disposal plans (Sally, 2000; Ogundiran, 2008).

In some areas, the atmospheric deposition of pollutants has reached levels which are toxic to human and organisms. Therefore, the measurements of the fluxes of pollutants from the atmosphere in urban and non-urban environments can aid in the assessment of air quality and can be used to determine spatial, temporal and seasonal variability of pollution sources (Howard, 1987).

Soil constitutes part of vital environmental, ecological and agricultural resources that have to be protected from further degradation as on adequate supply of healthy food needed for the world's increasing population. Heavy metals can affect both the yield of crops and their composition. Thus, determination of the elemental status of a cultivated land has to be made in order to identify yield-limiting deficiencies of essential micronutrients of plants grown on polluted soils (Elsokkary and Lag, 1980; Alloway, 1990).

Some heavy metals are essential in trace amounts, namely Zn, Cu and Mn for plants and in addition Co and Ni for animals. On the