Abstract

Increased industrialisation, urbanization, human population, and unregulated anthropogenic activities have led to an increased waste generation which in turn pollutes soil, water and air. Increased pollution is harmful to both plants and animals, which consequently affect humans. Most methods which have been applied by farmers in removal of pollutants from the soils are very expensive and unreliable. They include soil washing, use of mechanical and chemical methods. Therefore, a greener technology such as phytoremediation, which decontaminates polluted environment without interfering with soil structure or soil micro-organism is necessary. The objectives of this study were to determine the diversity of the plants growing naturally in Kang'oki dumpsite and concentration of selected heavy metals in soil, water and plant tissues to assess the potential of the plants for their phytoremediation potential. The dumpsite is situated within Thika municipality in Kiambu County, Kenya. An inventory of all plants growing on the dumpsite was carried out employing a quadrat sampling technique. A quasi Randomized Complete Block Design was used in this study, with dumpsite subdivided into 14 sites, forming the sampling sites. Soil, water and plant tissues samples were collected from all sampling sites. Shannon-Weaver diversity index (*H'*) was used to compute species diversity. The samples collected were acid digested and Cd, Ni, Pb, and Cu concentrations in samples determined using Atomic Absorption Spectrometry analytical method at Chuka University Chemistry laboratory. The data obtained from water, soil and plants samples were further analysed using Statistical Analysis System version 9.4. The significant means were separated using Least Significance Difference at $\alpha = 0.05$. The bioaccumulation and translocation factors of the investigated plants were done to determine the phytoremediation potential of the plants. The dumpsite had high species diversity (*H`* = 0.94), with species evenness of 0.45, indicating that different levels of environmental disturbance have different effects on species diversity. Seventy one plant species belonging to 28 families were identified. Asteraceae was most dominant family. *Parthenium hysterophorus* belonging to the family asteraceae is the most widely occurring species while *Carica papaya*, *Opuntia violacea*, and *Pisum sativum* were rare species. Concentration of the metals in soil samples at different sites were significant ($p < 0.0001$). Concentration of Cd, Ni, Cu and Pb in water samples were significant ($p < 0.0001$) except for cadmium ($p > 0.053$). Water samples had low levels of Cu, Pb, Ni, and Pb in all the sites compared to plants and soil samples. In plant tissues, Cu had the highest in plants while cadmium was the lowest. All investigated plants showed translocation factor >1 while bioaccumulation factor for most plants were <1, indicating that the plants are hyperaccumulators. *Datura stramonium* showed BCF and TF for Cd and Cu >1, hence, it can be used for phytoextraction of Cd and Cu in a polluted environment. *Ricinus communis* showed bioconcentration factor and translocation factor for Ni >1, hence can be used for phytoextraction of Ni. Conclusively, the dumpsite has high levels of the studied heavy metals, therefore, the investigated plants can be utilized for eco-restoration of the dumpsite.