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Abstract

that Cr (153, 22 mg/L), Ni (30.71 mg/L) and Pb (9.55 mg/L) were detected from the soil but Cd was not detected. The plant analysis result indicated that the species Arundo donax, Ricinus communis and Vernonia amygdalina had a good potential plant that absorbs Cd, Cr and Pb in different concentrations, while Ni was not detected in the leaves of selected plants. The species Arundo donax accumulated Cr (80.90 mg/L), Pb (37.30 mg/L) and Cd (25.98 mg/L), Vernonia amygdalina accumulated Cr (83.59 mg/L), Cd (44.46 mg/L) and Pb (14.49 mg/L) and Ricinus communis accumulated Cr (62.06 mg/L), Cd (16.64 mg/L) and Pb (16.64 mg/L). It was concluded that the selected plant species had a good accumulation capacity of Cr, Pb and Cd for the phytoremediation activity.

Keywords: Accumulation capacity; Atomic absorption spectrophotometer; Heavy metals; Little Akaki River; Phytoremediation

Introduction

Consequent to global industrialization, heavy metal pollution is a widespread problem which has become a major environmental concern due to hazardous e ects on human and environmental health [1,2]. Air and water pollution by metals varies from soil pollution, because heavy metals persevere in soil for a longer time period as compared with the other compartment of the biosphere [3] In the latest decades, the yearly global release of heavy metals attained 22,000 t (metric ton) for cadmium, 939,000 t for copper, 783,000 t for lead, and 1,350,000 t for zinc [4-12].

Many phytoremediation technologies have been used for the remediation of polluted soils and water throughout the World [1,5]. Phytoremediation costs almost one-fourth of the other physical and chemical methods of pollutant treatment [5]. e major advantages of the process include: improvement of the soil quality, as it is driven by solar energy thus suitable to most regions and climates, cost e ective and technically feasible process, plants serve as su cient biomass for rapid remediation; promote high rhizosphere activity and nally restoration in a reasonable time frame of 2 to 3 years [1,2].

e plants, which are o en identi ed as bioaccumulators, have the ability to take up soil contaminants and Deposit them in their roots, as well as in their aboveground organs. According to Kowalska [6,10] it is necessary to point out that bioaccumulating plant species are normally characterized by high concentration factors, i.e., concentrations of the toxic substances are higher in their tissues than in the soil. Bioaccumulation factors of some plants can even reach 1000×. ere are plant species capable of intensive uptake of soil contaminants and, at the same time, are characterized by a signi cant production of biomass [6].

Previous experiments on giant reed suggested that the stem height and diameter, number of nodes, fresh and dry weight of leaves, and net photosynthesis were not a ected, indicating that plants tolerated the high concentrations of Cd and Ni [7,9]. On the other hand study conducted by Ref. [6,7]. Phytoremediation of soil polluted by

nickel using agricultural crops including ricinus using three levels of

Gulele sub city and Nefas silk la o sub city respectively, Addis Ababa, Ethiopia. e four sample sites were selected based on preliminary survey (physical observation and discussion with woreda and sub city expert) and literature review than delineated as illustrated (Table 1 and Figure 1).

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pollutant discharging. Soil samples were randomly collected within the river bank whilst plant leaf samples were collected from dominates plant that was growing along the river banks [4,8,9].

Data analysis methods

e elements of interest for these particular analyses were four (4) heavy metals and they are cadmium (Cd), lead (Pb), Chromium (Cr) and Nickel (Ni). All samples were analyzed using Atomic Absorption is experimental result indicated that Ni was not detected in all samples of leaf. is nding agree with the result of Yanqun et al. [7] and Alebachew [13] the possible reasons are listed by him is that Ni may be degraded in soil by microorganism activity (Phytodegradation) or stored other part of the plants (phytostablization) or both of them. heavy metals (Pb, Cr, and Cd) were detected in the tested plant leaves in di erent concentration, whereas Ni was not detected. According to Tilahun [12] the possible reasons to this concentration di erence are growth rate of plants, there ability of absorbed, accumulated capacity of heavy metals in their parts and the depth of root zones or other. As illustrated in Figure 2, *V a a a a* had good potential of absorbing and accumulating Cr than the others. While *A a* had relatively good capacity to store Pb than the others.

Conclusion

is study generally showed that the leaves samples of . . *a a* . *a* . *a* and *A* . . . . . *a* had high potential of absorbing Cr and Pb comparatively. Whereas the leaves of . . *a a* . *a* . *a* had high potential of absorbing Cr and Pb paralleled to others plant species. Cd, Pb, Ni and Cr was detected in all sampled (soil, water and leaves), whereas Ni was not detected from all sampled plant species leaves. erefore planting those plants around polluted river bank for the remediation of Cr, Pb and Cd is very important. is study was conducted in eld leaf samples, an extended and detailed experimental study in a controlled manner is necessary.

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