

PHYTOREMEDIATION OF HEAVY METALS IN *COLOCASIA ESCULENTA* IN DIFFERENT REGIONS OF PUTTIGE VILLAGE

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ABSTRACT: Heavy metals are among the hazardous contaminants in the environment. Beside the natural activities, almost all human activities also have potential contribution to produce heavy metals as side effects. Contamination of heavy metals represents one of the most pressing threats to water and soil resources, as well as human health. *Colocasia esculenta* is an edible tropical plant. It is believed to be one of the earliest cultivated plants and it is involved in the bioaccumulation of heavy metals. Phytoremediation of heavy metals in *Colocasia esculenta* is the indicator of environment pollution. Hence the present study was undertaken to estimate the amount of heavy metals accumulated in Colocasia leaves. The Colocasia leaf samples from different regions of Puttige Village were tested for Pb, Cd, As and Hg by atomic absorption spectrophotometer. The moisture content found higher in sample 1 than in sample 2. Cadmium level was found to be higher in sample 1 than in sample 2. Mercury was not detected in both the samples. Arsenic level was below detectable limit in sample 1. Higher level of lead was found in sample 2 than in sample 1.

Keywords: Phytoremediation, Heavy Metals, Atomic absorption spectrophotometer.

Introduction

Determination of chemical composition of plants is one of the most frequently used methods of monitoring environmental pollution¹. Various plants have been used as bioindicators to assess the impact of a pollution source on the vicinity which is due to high metal accumulation of plants². Uptake of elements into plants can happen via roots from soil and transported to the leaves; also they may be taken up from the air, or by precipitation directly via the leaves used *Polytrichum junipericum* found on the bark of *Azadrachta indica* to assess heavy metal pollution and confirmed that the concentrations of pollutants in the tree bark correlate with those of the environment³. Soil and vegetation pollution have been a serious problem in recent years in Nigeria, especially among the communities living along the major highways. Excessive accumulation of heavy metal in agricultural land through traffic emission may results in soil contamination and elevated heavy metal uptake by crops, and thus affects food quality and safety⁴. The Nigerian situation is further exacerbated by the reality of increasing large-scale importation of old/fairly used vehicles for use on the Nigerian highways⁵. Heavy metals are important group of pollutants. They are non-biodegradable, hence are not readily detoxified and removed by metabolic activities once they are available in the environment. This may subsequently lead to their build up to toxic levels or bioaccumulation in ecosystem. Bioaccumulation of these heavy metals in man, animals and plants result in metal poisoning⁶. Metals enter the system through the food chain from environmental contamination. Heavy metals are natural constituents of the Earth's crust and are present in varying concentrations in all ecosystems. However, human activity has drastically changed the biogeochemical cycles and natural balances of some of these metals⁷. Consequently, due to increase in environmental pollution, this study is to estimate the levels of Pb, Cd, As and Hg in Colocasia leaves in Puttige village, Moodbidri in order to assess the level of accumulation of these metals in the leaves as a measure of environmental pollution as well as the health risks on the part of the consumer⁸.

Methodology:

Collection of samples: *Colocasia esculenta* plant samples were collected from two different places of Puttige village and dried in an oven at 70⁰C and Inorganic ash was prepared by using heater.

Digestion of samples: An inorganic ash was transferred into a beaker and 10cm³ of concentrated nitric acid was added. Thereafter the flask was heated at 100⁰C for one hour. The digestion was diluted to 25 ml of water. This sample solution was then filtered through a filter paper. The concentration of lead, Cadmium, and Mercury was determined by using an atomic absorption spectroscopy⁸.

Results & Discussion

Table 1: Heavy metal concentration in the sample of *Colocasia esculenta* leaves.

| Serial Number | Parameter | Sample 01 (village) | Sample 02 (highway) |
|---------------|----------------------|---------------------|---------------------|
| 1 | Moisture content (%) | 0.724 | 0.703 |
| 2 | Total Ash | 0.626 | 0.683 |
| 3 | Cadmium as Cd (ppm) | 0.097 | 0.062 |
| 4 | Mercury as Hg (ppm) | BDL* | BDL* |
| 5 | Arsenic as As (ppm) | BDL* | 3.605 |
| 6 | Lead as Pb (ppm) | 0.752 | 0.878 |

*BDL – Below Detection Limit

The results of this study have indicated the presence of the heavy metals at varying degrees in the samples of *Colocasia* leaves from two different locations of puttige village. Cadmium in the two samples was found very low. Samples from highway showed highest contamination of Arsenic and lead. This might be attributed to the geological status of the area under investigation, the ability of plants and their specific parts to accumulate metals and as well as the vehicular emissions along the highway.

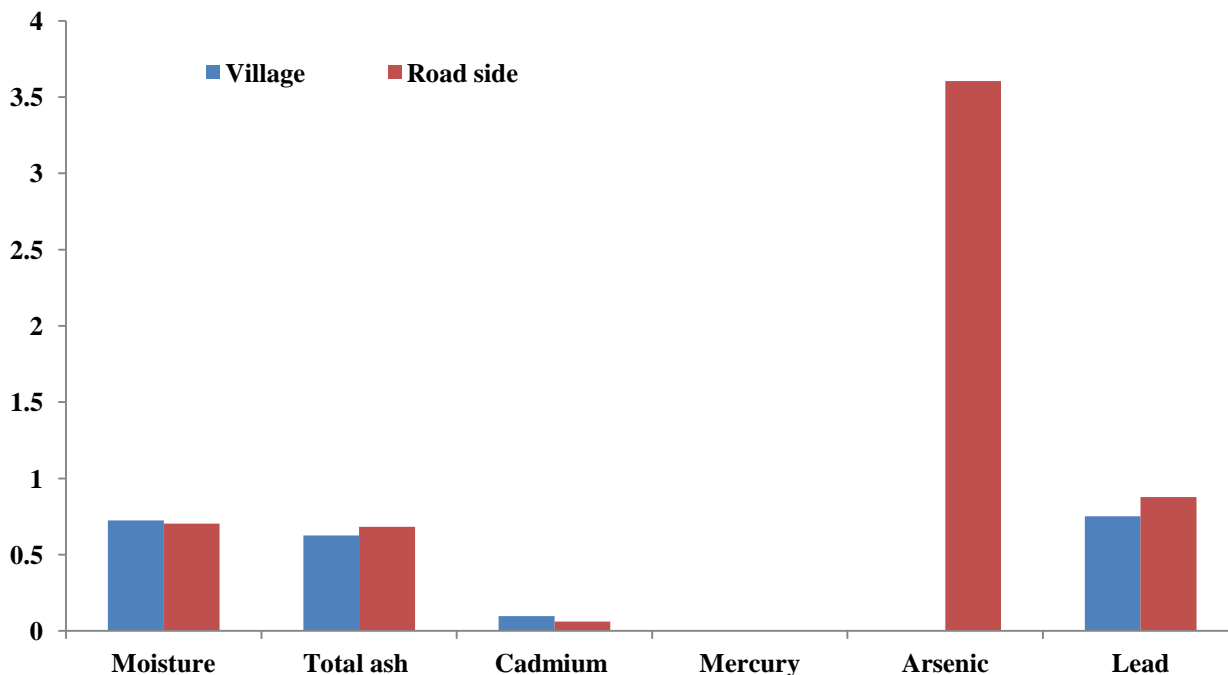


Fig 1: Heavy metal concentration in the samples of *Colocasia esculenta* leaves.

Conclusion

This study confirms the increased danger of environmental pollutions along our highways due to vehicular emission. The consumption of *Colocasia* leaves near the highways can put the consumers at risk health wise.

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