

Effect of Zinc on Road Side Useful Plant Leaves in Bhopal District



Science

KEYWORDS : Concentration, Heavy metal, Unwashed and washed plant leaves, Digestion.

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ABSTRACT

Effect of Zinc on important road side plant species Viz. Tamarindus indica (imli) (Leg.) Zizyphus Jujuba (Ber) (Rhan) Psidium guajava (Amrud) (Myrta) Azadirachta India (Neem) (Meli). The concentration of Zn was determined in washed and unwashed road side plant leaves. Differences between the concentration of metal Zn in unwashed and washed samples varied according to the metal pollution level of all the plants. The unwashed plant leaves of Azadichta Indica (Neem) showed highest concentration of Zn with a mean of 4.240 PPM.

Introduction :

The information about zinc as heavy metal pollutant has been studied by Dany & Verma¹ and phoor etal.². As zinc is an important micronutrient as well as heavy metal pollutant, it was of great interest to study its effects on the road side plant leaves .Four important plant species i.e. zizyphus jujuba (rhan.) psidium guajava (myrta.) Azadirachta indica (meli.)³ Tamarindus indica (Leg), were found at different concentration. The higher concentration of Zn in all plant leaves have been used for biomonitoring of heavy metals since 1950.

Materials and method :

Site selection- Sample of plant leaves were collected from road side of busy university area in Bhopal during june 2009, Plant samples were divided into two sub samples One sub-sample was thoroughly washed with double distilled water to remove dust particles and the other remained untreated (Unwashed).

Sample preparation- The method used for the plant digestion is same as described AOAC et. al⁴. three gram of sample taken in conical flask and add 10ml concentrated HNO₃ and left it over night. All conical flasks kept on hot plate with gentle heating and evaporate to dryness. Again add 10ml concentrated HNO₃ and remove it by heating.

this process was repeated until the residue

became white, in the obtained white residue of sample add 5ml of digestion mixture (Concentrated HNO₃ and Con.HClO₄ 5:1 V/V). Now these samples were heated gently on hot plate for complete digestion, after dryness digested samples were transferred to the 10ml volumetric flask and make up with 1% nitric acid.

Instrumental Analysis :

The concentration of zinc in all important vital plant samples were estimated by AAS technique using (GBC Avantaz) the concentration of zinc in unwashed and washed plant leaves were found in variation 4.240ppm, 3.717ppm. 4.198ppm. 3.934ppm. 4.116ppm. 3.668ppm. 3.824ppm. and 3.670ppm.

Result and discussion :

The mean of concentration of heavy metal (zn) found in unwashed and washed road side plant leaves are shown in table-1. The highest concentration of Zn i.e. 4.240ppm among all the plant leaves as found in Azadirachta Indica.

Table - 1 Unwashed and washed concentration of estimated Zn in roadside plant leaves (Premansoon)

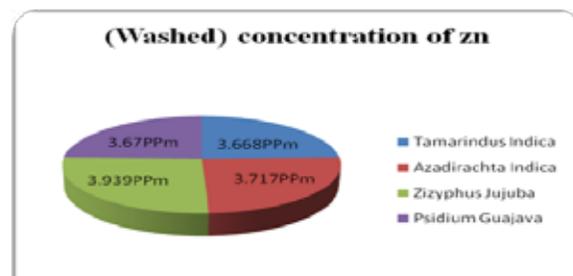
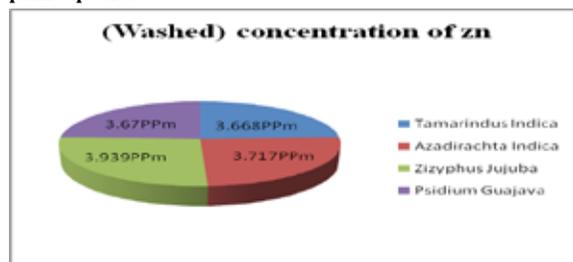
S. No.	Plant Species	(Un washed) concentration of zn	(Washed) concentration of zn
1.	Tamarindus Indica	4.116 PPM	3.668 ppm

2.	Azadirachta Indica	4.240 PPM	3.717 ppm
3.	Zizyphus Jujuba	4.198 PPM	3.939 ppm
4.	Psidium Guajava	3.824 PPM	3.670 ppm

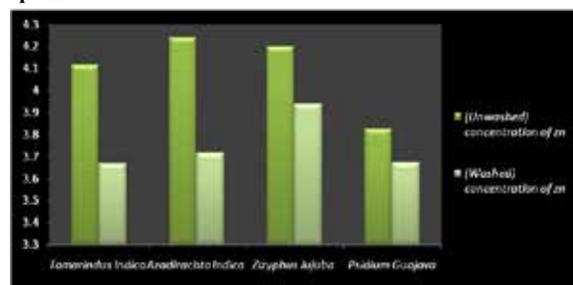
The pollution level was found in the samples taken from road sites.

It may be concluded that, Azadirachta indica in a great pollution source far it surroundings. Plants have a higher capacity to take up metals from atmosphere than their physiological and may enter the plant through aerial parts including the leaf surface. This high Zn concentration is observed in plants growing near area of busy traffic and industrial activities.

Graphical representation of Zn in washed and unwashed plant species



Comparative studies of Zn in washed and unwashed plant species



Harmful Effects on plants and Human beings

The reduction in germination percentage of plants at higher concentration of zinc may be attributed to the interference of metalation which may inhibit seed germination by exerting unfavorable effects on the activities of hydrolytic enzyme involved in mobilization of major reservoirs⁵.

Apart from Zinc, a range of other heavy metal, such as aluminium (shem et al.1972)⁶, Cadmium(Kalita et al.1993,Saravanan et al.1997)⁷⁻⁸, Chromium (Corradi et al, 1993)⁹, Mercury (Ganesan & Manoharan1983)¹⁰, and Nickel(Vijayarengan 1993)¹¹, also cause similar reduction in growth of the seedlings.

A survey of road side heavy metal contaminant in Hong Kong found a significant correlation.

Between traffic density and Pb, cu, and Zn concentration, Pb is less mobile than the Cd and Zn¹²⁻¹³.

Zinc is essential for the normal functioning of all biochemical reactions including protein synthesis, cell division growth and carbohydrate metabolism Zn is present in plasmic bones, hair nails and blood. The normal recommended daily dietary allowance of Zinc is 15mg. for adult. In human being the increased concentration of Zn from vital road side plant leaves occurs metal fume fever, depression, cough vomiting headache and salivation electrolytic imbalance, dehydration, lethargy. Dizziness pneumonitis may occur due to excessive zinc.

Conclusion

It is a point of interest that the concentration of Zn is higher in unwashed plant leaves than washed plant leaves. It shows that the rainfall May decreases Zn concentration in road side plants which are then useful to human beings. High concentration of Zn in edible plants increases the toxic effect in human beings e.g. Electrolytic imbalance, dehydration, lethargy, dizziness, pneumonitis and incoordination. Thus at average rainfall can decrease the Zn concentration in useful plants, to protect human being for various harmful effects.

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