



Short Communication

Investigation of Zinc Concentration in Some Medicinal Plant Leaves

Rathore J.S. and Upadhyay Mohit

Environmental Chemistry lab, Department of Chemistry, Jai Narain Vyas University, Jodhpur, Rajasthan INDIA

Available online at: www.isca.in

Received 30th December 2012, revised 14th January 2013, accepted 26th January 2013

Abstract

Zinc activates 300 enzymes and it plays role in many other phenomenon like growth, membrane stability, bone mineralization, tissue growth and repair, wound healing and cell signaling. It is also an integral part of fetal development and sperm production. Analysis of zinc in the leaves of Neem (*Azadirachta indica*), sajna (*Moringa oleifera*) and Tulsi (*Osmium sanctum*) were determined. Tulsi leaves contains higher amount of zinc than other plant products. We obtained zinc concentration in Neem (*Azadirachta indica*), sajna (*Moringa oleifera*) and Tulsi (*Osmium sanctum*) respectively 32.6 µg/g, 21.3 µg/g and 48.5 µg/g by using Atomic absorption spectrophotometer. This analysis may be useful in the exploration of medicinal values of these species.

Keywords: Zinc, medicinal plants, neem, tulsi, sajna.

Introduction

Zinc is an important metal in biological systems as it is a strong Lewis acid, forms a stable Zn²⁺ ion, and can exist in several coordination geometries. In proteins, zinc ions play valuable roles in both enzyme catalysis and maintaining structure. The physiological effects of zinc deficiency are associated with a number of diverse biochemical changes. In general, zinc is essential for Growth and nucleic acid activity and it is ubiquitous in nature. Zinc has three critical functions- catalytic, structural, and regulatory¹.

Zinc is the only elements which activates 300 enzymes. Zinc is an essential trace mineral for DNA synthesis, cell division, and protein synthesis², all necessary processes for tissue regeneration and repair. Zinc deficiency has been associated with poor wound healing and decreased breaking strength of animal wounds³, which can result from decreased protein and collagen synthesis during healing found in zinc-deficient animals⁴.

The leaves of medicinal plants have various health-promoting effects on human. These leaves may be suitable singly or in combination as therapeutic agents and are important raw materials for manufacturing traditional and modern medicines.

Neem (*Azadirachta indica*) is a useful traditional medicinal plant in India. Each part of the neem tree has some medicinal properties and is commercially exploitable for the development of medicines and industrial by-products.⁵

The fruits of sajna (*Moringa oleifera*) are used in hepatitis and spleen inflammation, arthritis, tetanus and paralysis. The leaves possess antihypertensive activity⁶.

The extract of tulsi (*Ocimum sanctum*) leaves is hypoglycaemic, immuno-modulatory, anti stress, analgesic, antipyretic, anti-inflammatory, anti-ulcerogenic, antihypertensive, radio-protective, anti-tumour and antibacterial⁷.

The present study concerned with the assessment of the zinc content in these plant leaves. This study has been focused to estimate the concentration of zinc metal ion in these medicinal plant leaves which may act as a therapeutic agents. A detailed literature survey about research working for investigation of zinc concentration in some medicinal plants leaves were used for investigation and evaluation⁸⁻¹⁸.

Material and methods

Collection and preparation of sample: The leaves of neem, sajna, and tulsi were collected from trees grown in the rural area of Jodhpur District. In the laboratory, each sample was washed with milliQ water and dried in an oven at 70°C and they were grounded into powder, sieved and then kept in an air tight screw cap plastic containers ready for digestion¹⁹.

Digestion of Samples: The samples in the powdered form were accurately weighed and digested in (3:2) mixture of nitric acid and perchloric acid. After digestion few drops of concentrated HCl was added. The solution was heated gently and then filtered. The residue was again subjected to digestion and filtrate was collected. The entire filtrate was diluted suitably with distilled deionized water. The dilute filtrate solution was used for analysis of Zn by AAS (Perkin Elmer 2380 model) using suitable hollow cathode lamps. The concentration of zinc was determined by relative method using A.R. grade solutions of elements of interest. Analysis for each sample was carried out in triplicate to get representative results.

Table-1
Concentration of zinc in various leaf samples

S.No.	Sample	Concentration of zinc ($\mu\text{g/g}$)
1.	Neem (<i>Azadirachta indica</i>)	32.6
2.	Sajna (<i>Morienga oleifera</i>)	21.3
3.	Tulsi (<i>Osmium sanctum</i>)	48.5

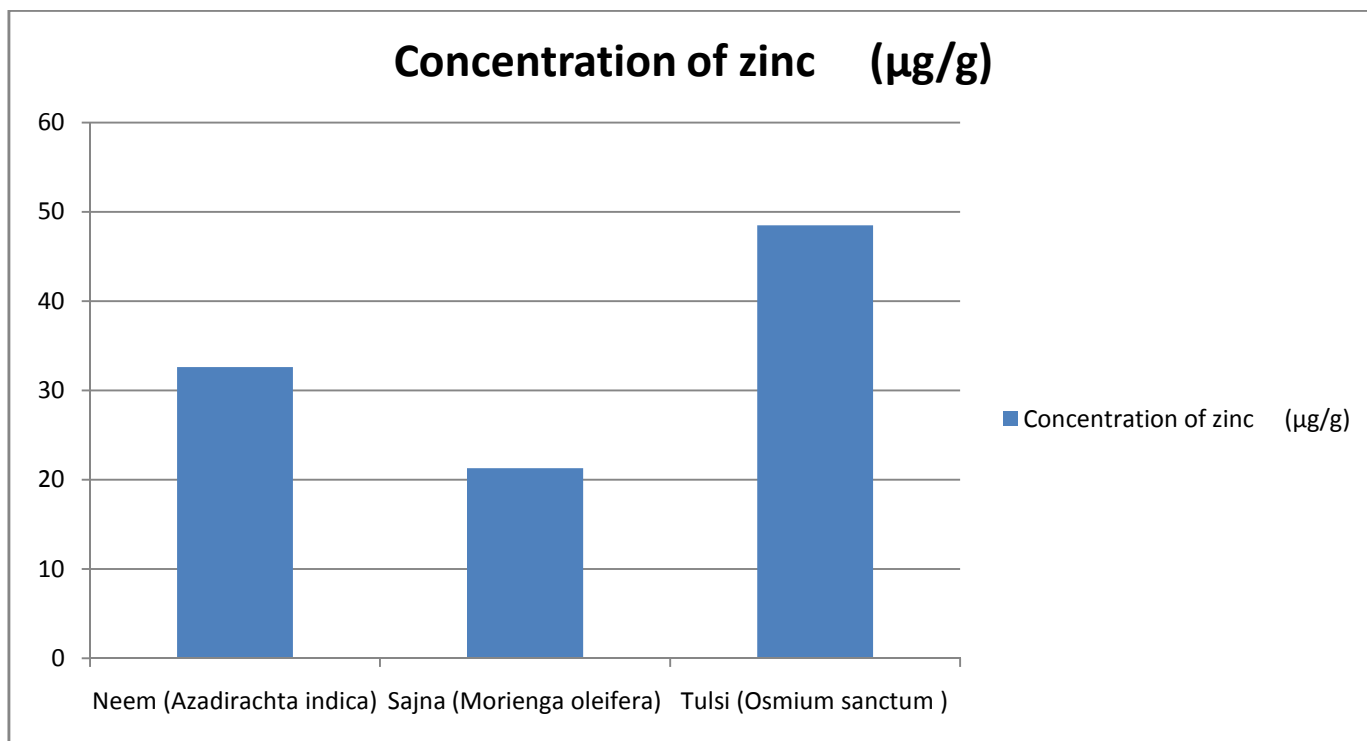


Figure-1
Concentration of Zn in Neem, Sajna and Tulsi Leaves

Results and Discussion

Table-1 and figure-1 shows the mean concentrations of Zn in the samples of neem, sajna and tulsi tree leaves obtained from rural area of Jodhpur District. The highest concentration of Zn found in tulsi leaves and lowest in sajna leaves. We obtained zinc concentration in Neem (*Azadirachta indica*), sajna (*Morienga oleifera*) and Tulsi (*Osmium sanctum*) respectively 32.6 $\mu\text{g/g}$, 21.3 $\mu\text{g/g}$ and 48.5 $\mu\text{g/g}$.

Conclusion

The result from this study showed that the leaves of Tulsi (*Osmium sanctum*) is a good source of zinc and it can be highly effective in the supplementation for the zinc deficiency. Zinc complexes were reported to have anti-ulcer activity as it acts as an anti-inflammatory and antioxidant so Tulsi leaves can be used for this purpose. In spite of these interesting findings, efforts should be made to quantify the antinutrients in the leaves

of these plants so as to actually determine their safety consumption as medicinal plants.

Acknowledgement

The authors are thankful to Jai Narain Vyas University, Jodhpur (Rajasthan), India for providing all necessary research facilities during this investigation.

References

1. Cousins R.J., Zinc In: Bowman BA, Russell RM, eds. Present knowledge in nutrition, Washington, DC: ILSI Press, 445–57 (2006)
2. Prasad A.S., Zinc: an overview, *Nutrition*, **11**, 93-99 (1995)
3. Agren M.S., Franzen L., Influence of zinc deficiency on breaking strength of 3-week-old skin incisions in the rat, *Acta Chir Scand*, **156**, 667-670 (1990)

4. Fernandez-Madrid F., Prasad A.S., Oberleas D., Effect of zinc deficiency on nucleic acids, collagen, and noncollagenous protein of the connective tissue, *J. Lab. Clin. Med.*, **82**, 951-961 (1973)
5. Bhowmik S. et al., Chemical composition of some medicinal plant products of indigenous origin, *The Bangladesh Veterin.*, **25(1)**, 32–39 (2008)
6. Das S.K., Vasudevan D.M., Tulsi: the Indian holy power plant, *Nat. Prod. Radianc*, **5**, 279-283 (2006)
7. Ghani A., Medicinal Plants of Bangladesh: Chemical Constituents and Uses, *Asiatic Society of Bangladesh, Dhaka* (2000)
8. Ondo J.A., et al., Effects of Cu and Zn Supplementation on Metal Uptake by *Hibiscus sabdariffa*, *Res. J. Chem. Sci.*, **2(11)**, 45-50 (2012)
9. Mondal Debashri and Mondal Tamal, A Review on efficacy of *Azadirachta indica* A. Juss based biopesticides; An Indian perspective, *Res.J.Recent.Sci.*, **1(3)**, 94-99 (2012)
10. Pathak C., Mandalia H.C. and Rupala Y.M., Biofuels: Indian Energy Scenario, *Res.J.Recent Sci.*, **1(4)**, 88-90 (2012)
11. Mishra S.R., Mohanty M.K., Das S.P. and Pattanaik A.K., Production of Biodiesel (Methyl ester) from *Simarouba Glauca* oil, *Res.J.Chem.Sci.*, **2(5)**, 66-71 (2012)
12. Mangale Sapana M., Chonde Sonal G. and Raut P.D., Use of *Moringa oleifera* (Drumstick) seed as Natural Absorbent and an Antimicrobial agent for Ground water treatment, *Res. J.Recent.Sci.*, **1(3)**, 31-40 (2012)
13. Enemose Edith A. and Osakwe S.A., Studies on the effect of pH on the sorption of Al³⁺ and Cr⁶⁺ ions from Aqueous solutions by Almond tree (*Terminalia catappa* L.) Biomass, *Res.J.Chem.Sci.*, **2(4)**, 13-17(2012)
14. Eman A. Alam, Initiation of Pharmaceutical factories depending on more Application of Bio technology on some Medicinal plants Review article (In Vitro production of some Antioxidant, Analgesic, Antibacterial, Antidiabetic Agents), *Res.J.Recent Sci*, **1**, 398-404 (2012)
15. Nair Abhilash T., Pharmaceuticals in Environment: A review on its effect, *Res. J. Chem. Sci.*, **2(1)**, 103-105 (2012)
16. Nair Lethika D. et al., A Comparative study on Proximate Analysis conducted on Medicinal Plants of Chhattisgarh, CG, India, *Res. J. Chem. Sci.*, **2(9)**, 18-21 (2012)
17. Kumar Sukender et al., AAS Estimation of Heavy Metals and Trace elements in Indian Herbal Cosmetic Preparations, *Res. J. Chem. Sci.*, **2(3)**, 46-51 (2012)
18. Mondal Debashri, A Review on efficacy of *Azadirachta indica* A. Juss based biopesticides: An Indian perspective, *Res.J.Recent Sci.*, **1(3)**, 94-99 (2012)
19. Audu A.A. and Lawal A.O., Variation in Metal Contents of Plants in Vegetable garden sites in Kano Metropolis, *J. Appl. Sci. Envir. Mgmt.*, **10(2)**, 105-109 (2005)